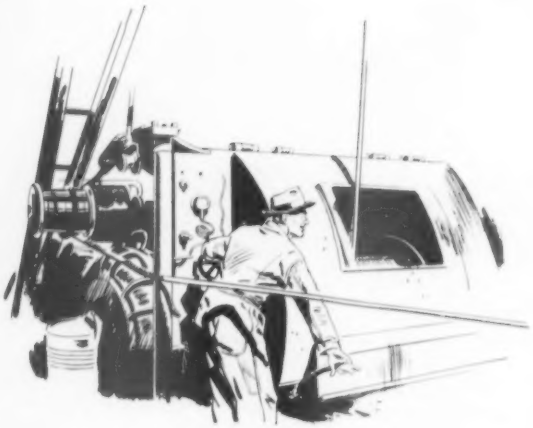
the OIL AND GAS JOURNAL

Fast drilling **REED** bit!



ONE of the most outstanding of the complete line of **REED** Rock Bits is the Twin-Blast, Two-Cutter Barracuda Bit shown here.

Primarily designed for top hole drilling, this **REED** Bit has turned in some outstanding performances drilling straight hole through sloping formations. Ask your **REED** representative for details.

REED ROLLER BIT COMPANY
HOUSTON 1, TEXAS

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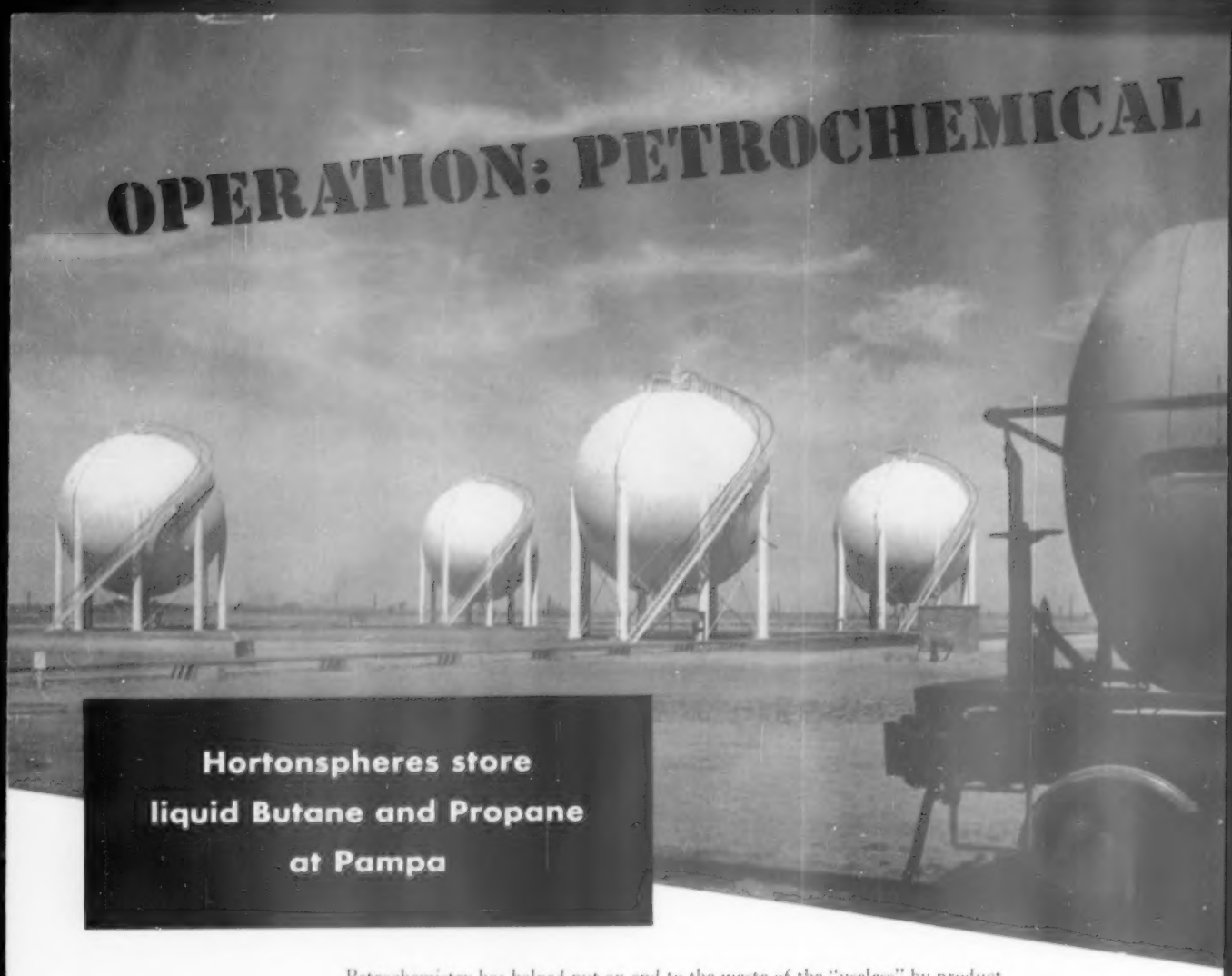
PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 JUNE 7, 1954

OPERATION: PETROCHEMICAL



Hortonspheres store liquid Butane and Propane at Pampa

Petrochemistry has helped put an end to the waste of the "useless" by-product, petroleum gas. Today, petroleum gas is a valuable material ideally suited to the needs of the U.S. chemical industry.

The four 6,000-bbl. Hortonspheres® shown in the view above, are used for the storage of liquified butane and propane at Celanese Corporation of America's petrochemical plant near Pampa, Texas. They are the first step in the process that turns petroleum gases, a by-product that was being discarded 30 years ago, into a multitude of things that we use, wear and live with. The Hortonspheres are 40-ft. 6-in. in diam. and were designed for an operating pressure of 75 lbs. per sq. in.

Hortonspheres are available in capacities up to 30,000-bbls. and for pressure up to 217 lbs. per sq. in. in the smaller capacities. Write our nearest office for further information, estimates or quotations.

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Hortonspheres	Horton Vaportanks	Elevated Tanks
Hortonspheroids	Horton Vaporspheres	Refinery Towers
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Cleveland, 15.....2204 Midland Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
Pittsburgh, 19.....3228 Alcoa Bldg.
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In Brief . . .

1. MORE AMMONIA . . . At its new Vicksburg, Miss., works Spencer Chemical Co. utilizes 12 to 15 million cubic feet per day of natural gas to make 220 tons of anhydrous ammonia. Product facilities include units to make 110 tons of nitric acid, 140 tons of ammonia nitrate solution, and 350 tons of anhydrite solution daily.

The new plant is notable as the first ammonia plant to employ the partial-oxidation method for making hydrogen. The plant is outstanding in its compactness, featuring a high degree of process integration.

2. FRACTURE THROUGH SKIN . . . Possible success of a hydraulic fracturing job may be predicted by the bottom-hole-pressure buildup method of determining the pressure of a "skin" around the well bore. If such a skin exists, it is probably impairing flow of fluid into the hole, and can be removed by fracturing. Increased production should result.

3. ECONOMICAL HEAT RECOVERY . . . New techniques are being applied by Sun Oil Co. for the recovery of heat by catalytic burning of combustible materials and catalytic cracking unit gases. Potentially large quantities of recoverable heat are available from these gases and substantial fuel savings can be realized by the recovery of such heat.

4. PROBLEMS SOLVED . . . Problems on hole deviation may be alleviated and lowest drilling costs realized by proper choice of drill-collar and hole size. Size of the most economical hole is increased by formation crookedness, formation hardness, and depth. In hard and very severe crooked-hole formations, drilling costs may be reduced drastically by a large increase in collar and hole sizes. In extreme cases 11¼-in. or even 14 or 16-in. drill collars should be used. In mild crooked-hole formations, small clearance between hole and collar is advantageous. In very severe crooked-hole formations and for a fixed collar size hole clearance is unimportant from a rate of drilling and hole deviation standpoint.

5. LOWER COSTS . . . Maintenance of drilling mud depends greatly on the drilling practices in force. Cost can be reduced by alleviating these conditions which cause increased mud expense: (1) buckling of drill string to erode hole walls; (2) wall cutting; (3) in keeping hole full on trip; (4) excessive rates of pulling or running drill pipe, and (5) excessive or inadequate annular velocities.

PREVENT COSTLY VAPOR LOSS and BUCKLING *with* **OPW**

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There's a Vapor-Saving OPW Tank Vent for every purpose. They are your INVESTMENT against high volatile vapor loss due to product expansion and temperature variation. Weighted to specifications, they trap and hold vapors and release only at set pressures, which insure maximum protection and dollar dividends. Double mesh screen . . . readily accessible for inspection prevents flame from following vapor into tank maintains bulk storage safety at the highest level.

OPW No. 95—precision machined, product engineered for lifetime use, characterizes the rugged, simple construction common to all OPW Tank Vents. Available: 2" - 3" - 4" - 6" - 10"

Send for the OPW Tank Venting and Emergency Relief Recommendation Chart!

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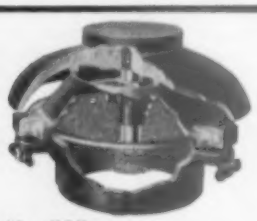
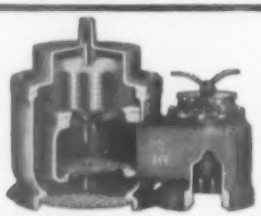


No. 209

Emergency escapement vent, for relief of pressure only. Used in conjunction with vacuum vents.



No. 245

Combination pressure, vacuum vent. 4", vacuum ½ ounce-pressure, 2 oz. to 2 lbs. 6", vacuum ¼ ounce-pressure, 1½ oz. to 1 lb.

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Belt service tripled with B. F. Goodrich Grommet belts

Grommet V belts last longer; cost no more than ordinary belts

WHEN ordinary belts were used to run that oil pump, they wore out in six weeks or less—some lasted only 3 days! They couldn't take exposure to weather, oil, or stand the weight of the 160-pound floating pulley (see arrow). The well is a "sander", so when the pump stops working, the whole pumping mechanism has to be pulled from the 3000-foot well, cleaned, and put back.

The oil company tested practically every make of V belt, but none solved the problem until they tried a set of B. F. Goodrich Grommet belts. Instead of giving just 3 days' or 6 weeks' service, the Grommet V belts were still on the job after *six months*, still going strong. B. F. Goodrich belts are now used almost exclusively on this oil lease. Here's why Grommet belts outlast and outperform other V belts:

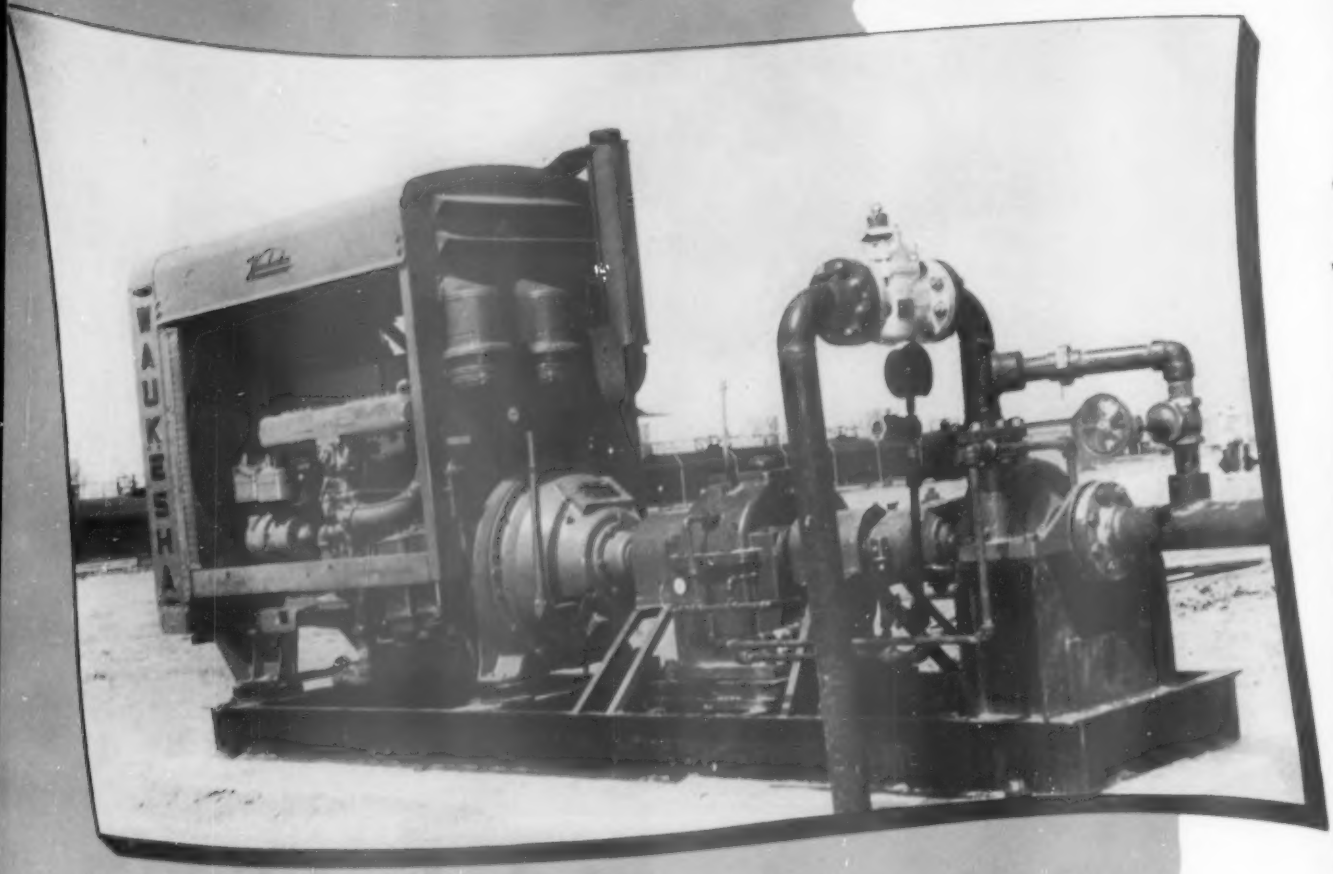
In Grommet belts, all the load-carrying cords are concentrated in twin grommets. A grommet is like a giant twisted cable except that it's endless. Since there are no center cords, the Grommet belt is more flexible, and so can "give" temporarily and absorb shock loads. And there are no overlapping cord *sections* as in all ordinary belts—no weak spots to cause premature belt failure. As a result, Grommet belts last 20 to 50% longer, depending on the service. (The tougher the service, the greater the increase over ordinary belts.)

If you're getting short service from your belts, try a set of the longer-lasting Grommet belts, and see the difference. You'll find these BFG V belts at leading supply houses in the oil field, or at any one of these B. F. Goodrich warehouses: Beaumont, Dallas, Fort Worth, Hobbs, Houston, Odessa, Wichita Falls, Great Bend, Oklahoma City, Tulsa, Williston, Denver and Los Angeles. *The B. F. Goodrich Company, Dept. M-242 Akron 18, Ohio.*

Grommet—T.M. The B.F.Goodrich Co.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

Do YOU have an Underground Storage Problem?



...then you'll be interested in this application of WILSON-SNYDER Type ES Centrifugal Pumps

Near Ulysses, Kansas, engineers of the Stanolind Oil and Gas Company decided that the most practical way to secure underground storage facilities for petroleum products would be to dissolve and wash out existing salt formations.

The unit pictured above was installed to handle this "wash-out" operation.

It consists of a Wilson-Snyder 3 x 4 x 13 Type ES centrifugal pump, rated at 500 gpm for a 693 foot head (300 psi) at 3550 rpm.

The pump is driven by a Waukesha 6-WAKU engine, direct-connected through a speed-increaser.

The entire assembly is mounted on a skid base and can be moved from one location to another as the progressive stages of this operation may require.

WHEN YOU . . . have pumping applications that require dependable performance, refer your problems to "Oilwell"—pioneers in the manufacture and application of pumping equipment.

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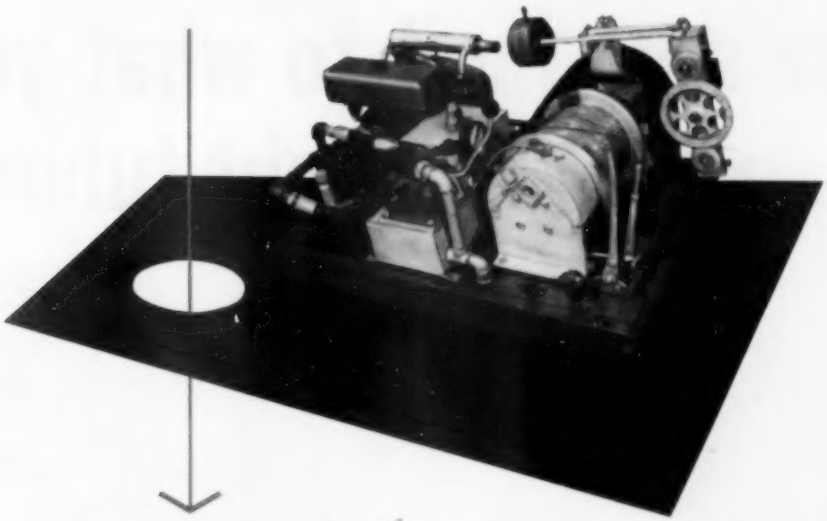

now...run bottom hole instruments with greater safety and speed!

HALLIBURTON'S *NEW*

hydro-drive

MEASURING ASSEMBLY

Running bottom hole instruments in the annulus between tubing and casing *was* a slow, hazardous job. Now, the great new Hydro-Drive Measuring Assembly speeds up these operations and provides safety features that help prevent any dangerous overloads on line or reel. These advantages are built into a rugged, new Measuring Assembly that provides the unmatched measuring accuracy that has been the Halliburton standard for thirty years.

The hydraulic "fluid drive" system assures safe control of line speeds ranging from zero to a maximum of approximately 520 feet per minute when a weight is being lowered or brought out. Even at maximum speeds, the pressure relief valve guards against excessive strain if a tool or instrument wraps around tubing or hangs up. The operator can always keep the load on measuring line and reel below breaking strength.

The unique powering system employs a hydraulic motor and pump that are driven by a 10.1 h.p. engine. The powerful action of this system, used for retrieving instruments from down hole, can be reversed to act as a hydraulic brake that smoothly regulates the speed while lowering instruments.

Hydro-Drive measuring is the latest development from Halliburton – the originator and leader of measuring devices for thirty years. The new Hydro-Drive Measuring Assembly combines the accuracy and dependability of *all* Halliburton measuring equipment with new speed and safety advantages. To get all the advantages, specify Halliburton. Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING EQUIPMENT

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

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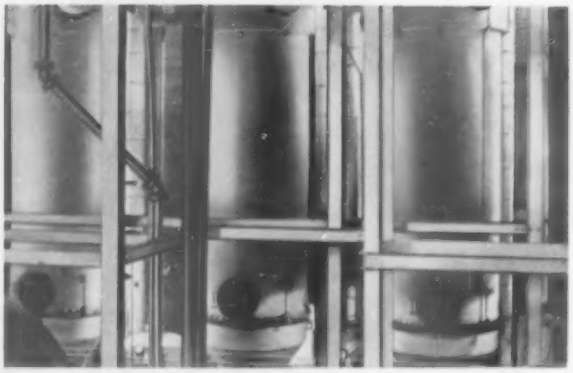
There's no limit to what you can do with the right tubing!

make power to light a city . . .

There are more than 12 miles of Globe seamless pressure tubing (carbon, alloy, and stainless) in this modern boiler which is a vital part of the electric power plant that serves a large metropolitan community.



transfer corrosive liquids . . .

Black liquor, used in production of kraft papers, is highly corrosive and has to be carried under pressure in multiple effect evaporators. Gloweld (electric welded) Stainless Steel Tubing was found to do the job best—at lowest cost.

or lift a load of dirt . . .

Mounted on a dump truck, these twin hydraulic hoists are built to handle heavy loads. Design and production is simplified by making the telescoping arms of Globe mechanical tubing.

THERE are probably a thousand and one different tube applications that could be made in your own products or industry. Check the possibilities. Globe engineers will be pleased to give helpful advice on how the right tubing — Globe tubing — can help you save time, save money, save manpower. Write for literature on any of these products.

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STAINLESS SEAMLESS: in sizes from ½ inch to 6 inches O.D., and in pipe sizes ⅛ inch to 6 inches, standard, extra strong and double extra strong weights.

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SPECIAL ANALYSES: Globe Steel Tubes Co. regularly produces tubing to special customer specifications. Consult with Globe's representatives for analyses to suit your needs.

GLOBE WELDING FITTINGS: seamless, carbon and stainless, available in a complete line of sizes and weights through Globe distributors in key cities.

Your drilling site joins the world

...with a Cat*-built road

Few things are as essential to oil fields as roads. That's why versatile, hard-working Caterpillar Motor Graders are seen everywhere. Road building is their meat.

The busy No. 212 Motor Grader in this picture is building a 1200-foot road from Frost No. 1 Well just completed, to No. 2 just started, near Rosharon, Texas, in the Lochridge field. The No. 212—easy to operate—can build roads from ditch line to ditch line quickly and at low cost.

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"Cat Motor Graders fit my needs exactly. The No. 212 is just right for general oil field work."

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And they don't balk at work or break down when you need them most. The reason is in their design. Weight, horsepower, traction and working speeds of all three models of Caterpillar Motor Graders are properly balanced. *One* manufacturer makes the frame, engine, transmission, final drive, circle, drawbar and mechanical controls.

But their performance speaks louder than these words. *Of all Caterpillar Motor Graders ever built, 99 per cent still are in service!*

You can't beat a record like that. So join it. Ask your Caterpillar Dealer for a demonstration on your job today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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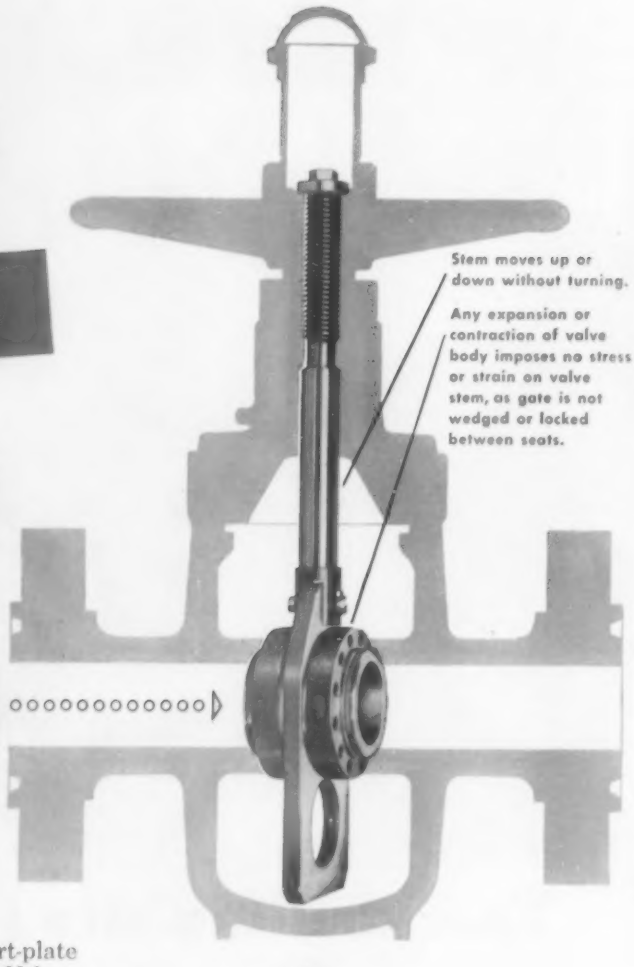
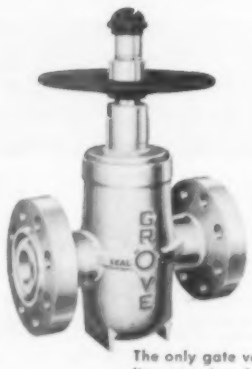

Stem moves up or down without turning.
Any expansion or contraction of valve body imposes no stress or strain on valve stem, as gate is not wedged or locked between seats.

GATE ACTION

avoids tensile, torsional or compressive strains and stresses

Open, closed or throttling, the parallel-sided port-plate and seat assemblies of Grove Seal-"O"-Ring Gate Valves are free-floating, permitting perfect self-alignment. This not only results in lowest possible operating torque, but also compensates for distorting temperature changes. No tortional, compressive or tensile strains or stresses are imposed on the stem, which actuates the gate through non-rigid coupling. The non-turning stem moves freely up or down with minimum friction. With stem, gate, or seats, there's no wedging, galling or sticking—and no possible chance of "freezing up." Positive dead-tight seal is established with pressure on either side of gate. Full-opening port permits unrestricted passage of scrapers. Impartial field test reports of Grove Seal-"O"-Ring Gate Valves on lines of leading companies will be supplied on request. Get full details today.

Available through leading oil field supply houses



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S-403

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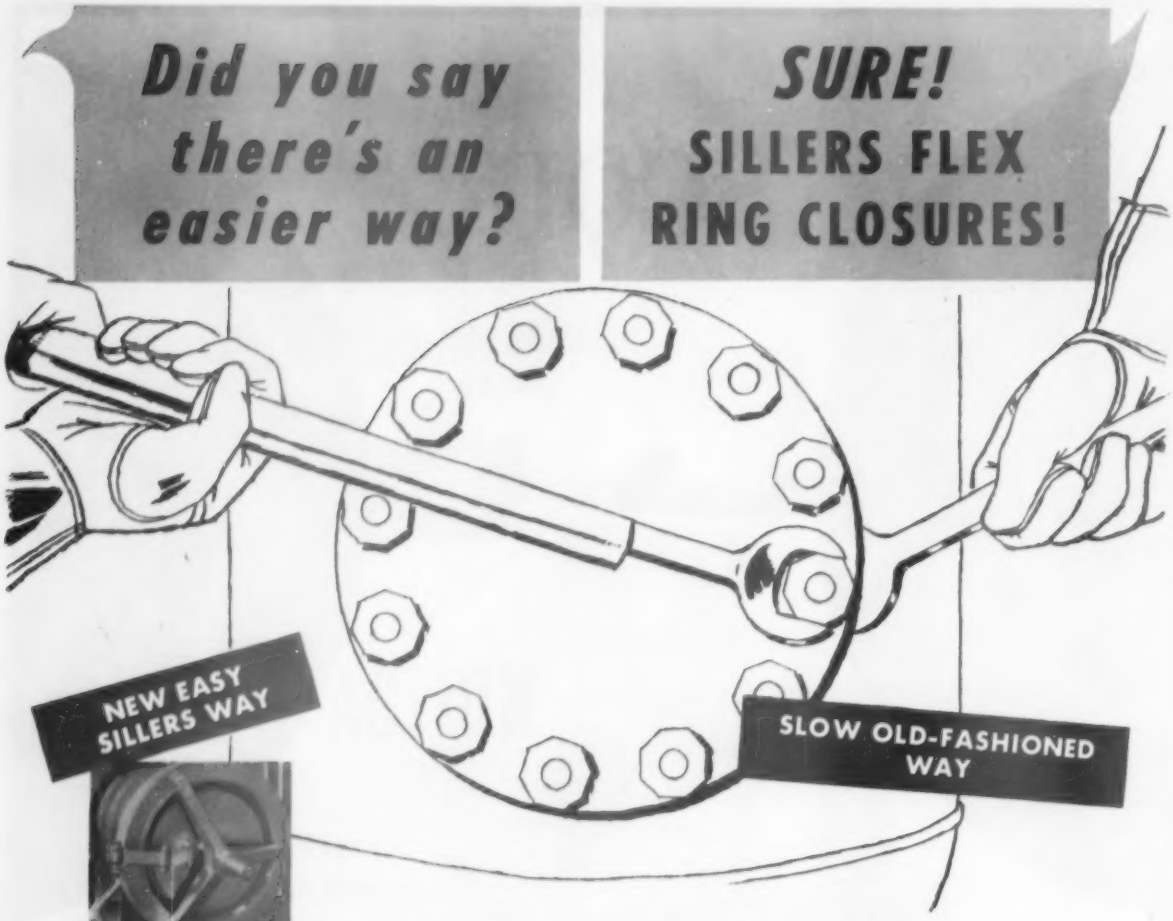

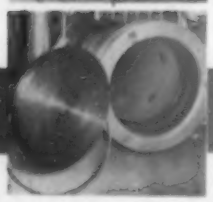

(1). Flex Ring Unit assembled as in service. (2). Spider released, gasket being removed. (3). After gasket is removed, plug is rotated to open. (4). Unit completely opened and in a fraction of time taken for conventional type closures.

Now . . . new SILLERS FLEX RING CLOSURES give easier, faster access to insides of pressure vessels and piping systems than was ever before possible. Incorporating an entirely new design and seal principle, the SILLERS FLEX RING CLOSURE gives you many advantages and economies such as low initial cost . . . less time in opening and closing . . . tighter seal at high pressures . . . less weight . . . and ease in handling. SILLERS FLEX RING CLOSURES are available in all standard sizes and quickly can be adapted for special applications.

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"MANIAC'S MOON" IS GOIN' DOWN!! **WE** IS LOSIN' TIME!! WOULDN'T YO' DRUTHER--
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FORMATION AND CASING TESTING — JOHNSTON

KING SIZE

This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

Vogt, a leading builder of shell and tube reactors for poly plants, has the competently skilled personnel and modern mechanical facilities with which to provide heat transfer equipment for the most exacting services in petroleum refineries, chemical plants, and related industries.

Reactors ...by Vogt

A bulletin describing the wide range of heat transfer equipment built by Vogt is available upon request.

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BRANCH OFFICES: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.

NEW

Axelson 6′ stroke hydraulic pumping unit

The Axelson Model H-100 answers the need for a pumping unit that has low initial cost coupled with trouble-free operation. An almost constant oil flow is possible because the unit combines a fast downstroke with a slow upstroke, thus increasing the volumetric efficiency of the sub-surface pump. Axelson's hydraulic reversal valve (patent applied for) assures a gentle reversal action which is easy on sucker rods.

CHECK THESE FEATURES:

TRIPOD BASE allows spacing of the sub-surface pump by insertion of sub-couplings between the well and unit polished rod. One leg of the base is used for porting high pressure fluid, while a second leg carries discharge fluid from cylinder base back to the fluid reservoir. A very important feature of this mounting assures no contamination of the hydraulic fluid. A flange at the bottom of the tripod base forms the upper mating surface of a special Axelson casing head adapter. Adapters are available to fit any standard well head casing flange.

CYLINDER BASE may be called the "hub" of the unit. The unit tripod attaches to the bottom of the base, the cylinder into the top portion and the reverse valve assembly attaches to one side. Both power and exhaust fluids are ported through the cylinder base. An important feature is the ability to provide adequate pressure at lower reversal, which assures operation of the pilot valve. This is an asset particularly important on viscous wells.

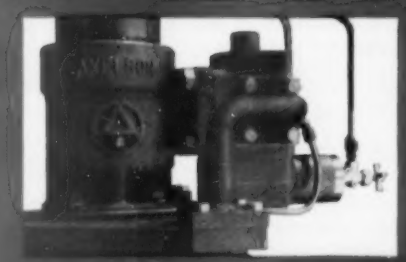
REVERSE VALVE AND PILOT VALVE are both hydraulically operated and the combination is simplicity itself in design. Only three pressure lines feed into the pilot valve. One is internally constructed to one end and two to the other end. Each of the pressure sources operates on different areas.

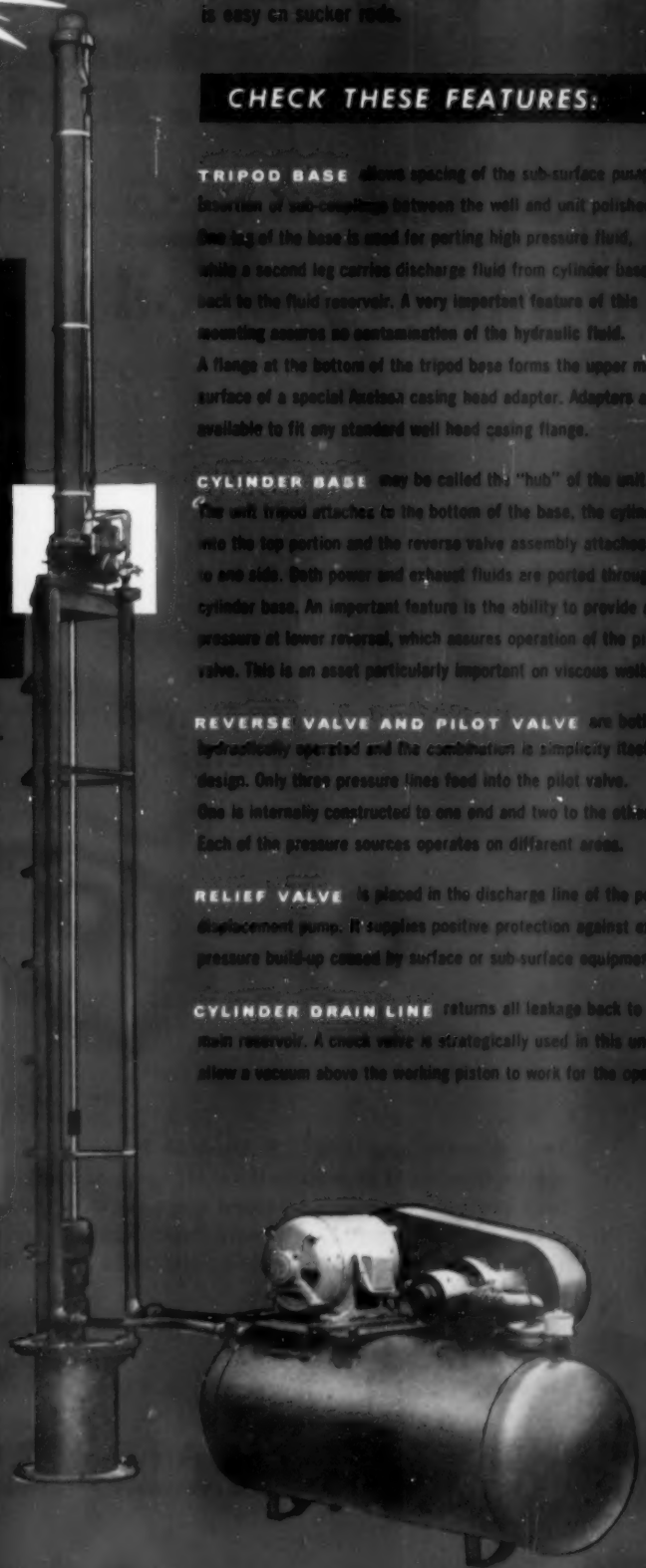
RELIEF VALVE is placed in the discharge line of the positive displacement pump. It supplies positive protection against excessive pressure build-up caused by surface or sub-surface equipment.

CYLINDER DRAIN LINE returns all leakage back to main reservoir. A check valve is strategically used in this unit to allow a vacuum above the working piston to work for the operator.

SPECIFICATIONS

Polished Rod Load (Max)	13,000 lbs.
Stroke Length (Nominal)	6 Feet
Strokes Per Minute (Max)	4.6
Upstroke Polished Rod Speed (Max)	36 FPM
Pump	40 GPM
System Fluid (Approx.)	85 Gals.
Cylinder Diameter	5 Inches
Operating Pressure (Max)	700 PSI
Input Horsepower (Max)	20 HP





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H-1515

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1. Weighs 2/3 less than conventional hose.
2. End fittings weigh 50% less.
3. Used by every major oil company. It has been tried and proven by up to 3 years' service.
4. More than 800 lengths of U. S. Amazon H-1515 now in service.
5. Its light weight eliminates accidents that occur with the handling of heavy hose.
6. Requires less manpower or mechanical handling devices to make connections for loading or unloading.
7. Instantly springs back to shape if crushed or folded.
8. It handles 200 pounds working pressure.
9. Dock workers are outspoken in praise of its lightness and ease of handling.
10. It is indispensable for hard-to-reach bunkering headers. Connections are made without the use of a hoist.
11. No further proof or trial is required to establish its superiority.
12. Easily transported—can be coiled or folded on truck or other vehicle for moving between locations.

More than 800 lengths of U. S. Amazon® H-1515 Oil Discharge Hose have been put into active service from coast to coast in the short space of 3 years—the superiority of this great hose has been proven and accepted beyond question. U. S. Amazon H-1515 is made only by United States Rubber Company and sold through any one of the 27 "U. S." District Sales Offices. Further information is obtainable by writing the address below.

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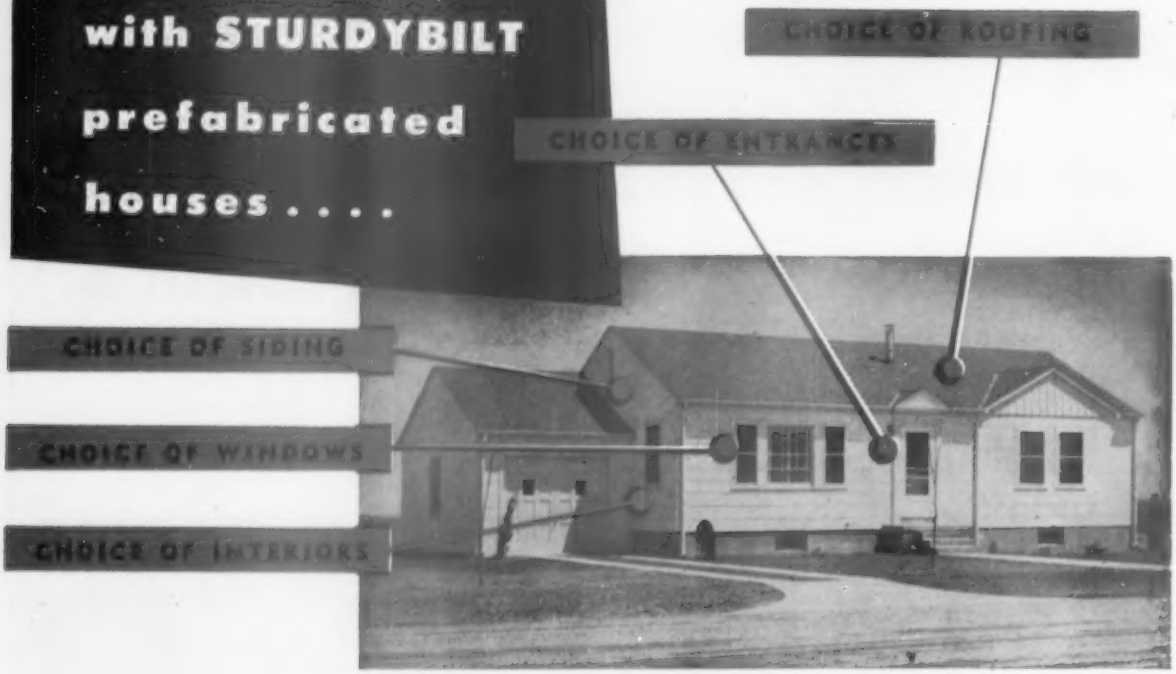

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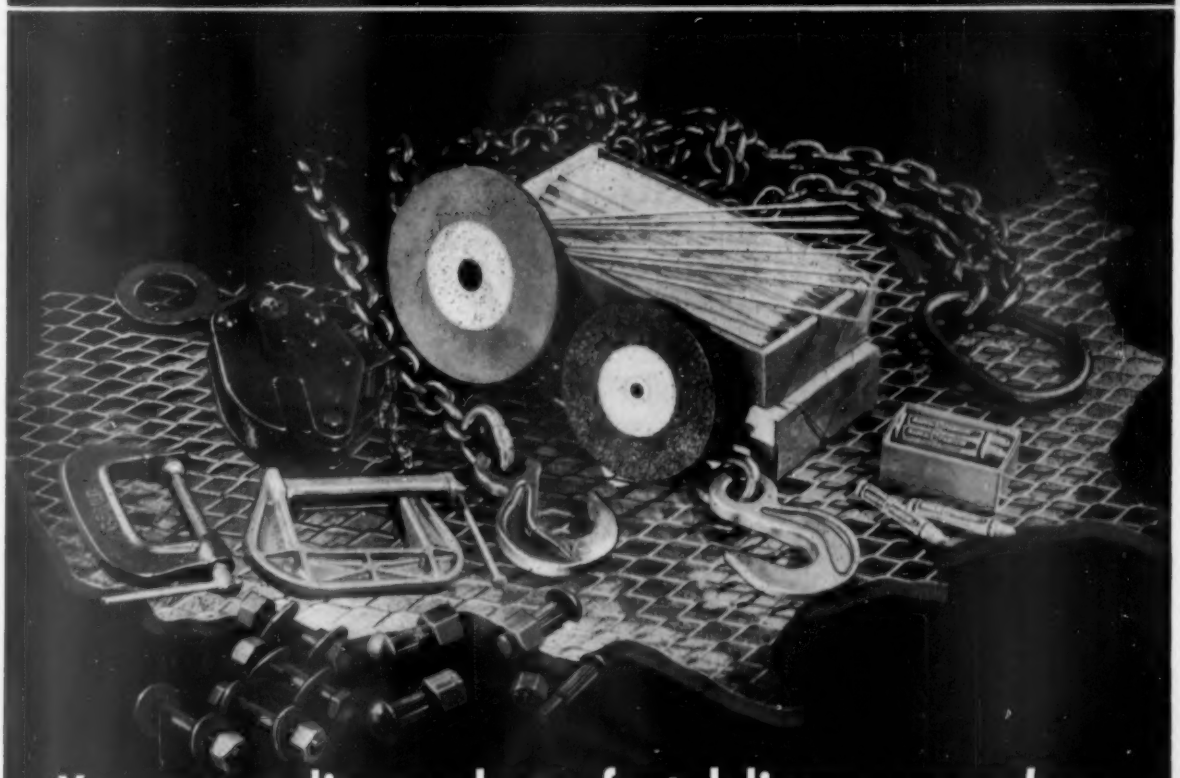

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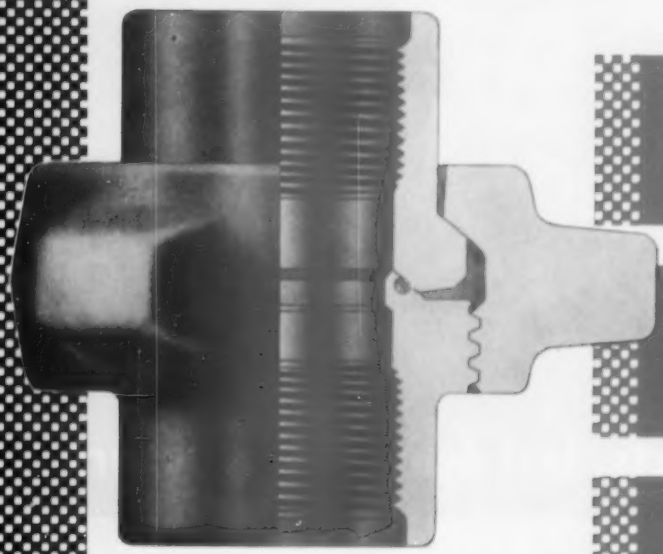

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It's built *big* to perform bigger jobs. It's built with the heavy-duty construction and moderate-speed design typical of all MM Oilfield Engines . . . with the kind of durability that takes cycle peak loadings in stride.

That's the Minneapolis-Moline 800-6A . . . the new six cylinder engine offering 5 3/16-inch bore, 6-inch stroke, and 800 cubic inch piston displacement. With this 800-6A, lower piston speeds for less wear result in longer engine life, less down time and fewer service costs. All of the MM continuous-duty advantages which have proved so outstanding in oil industry operations work for you.

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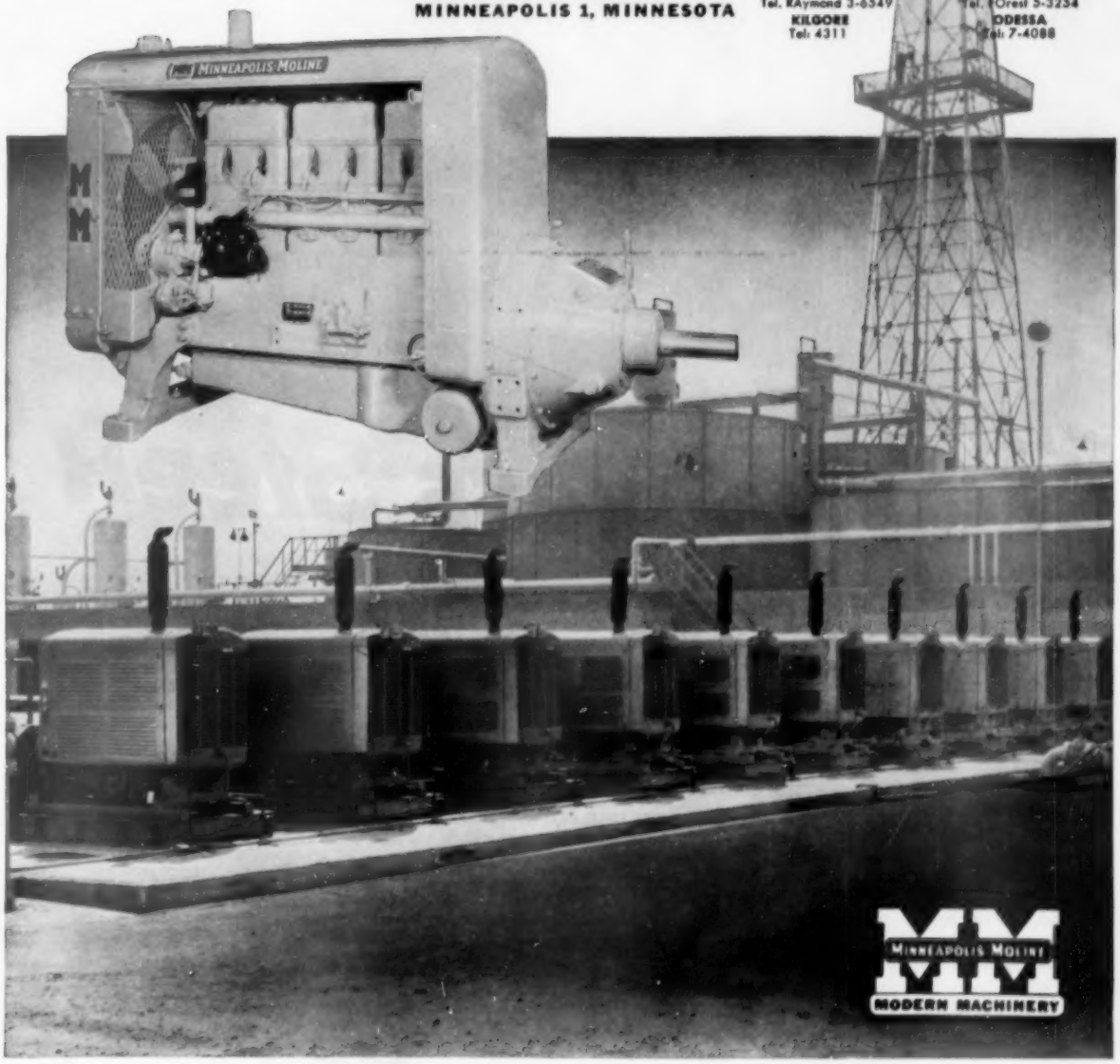

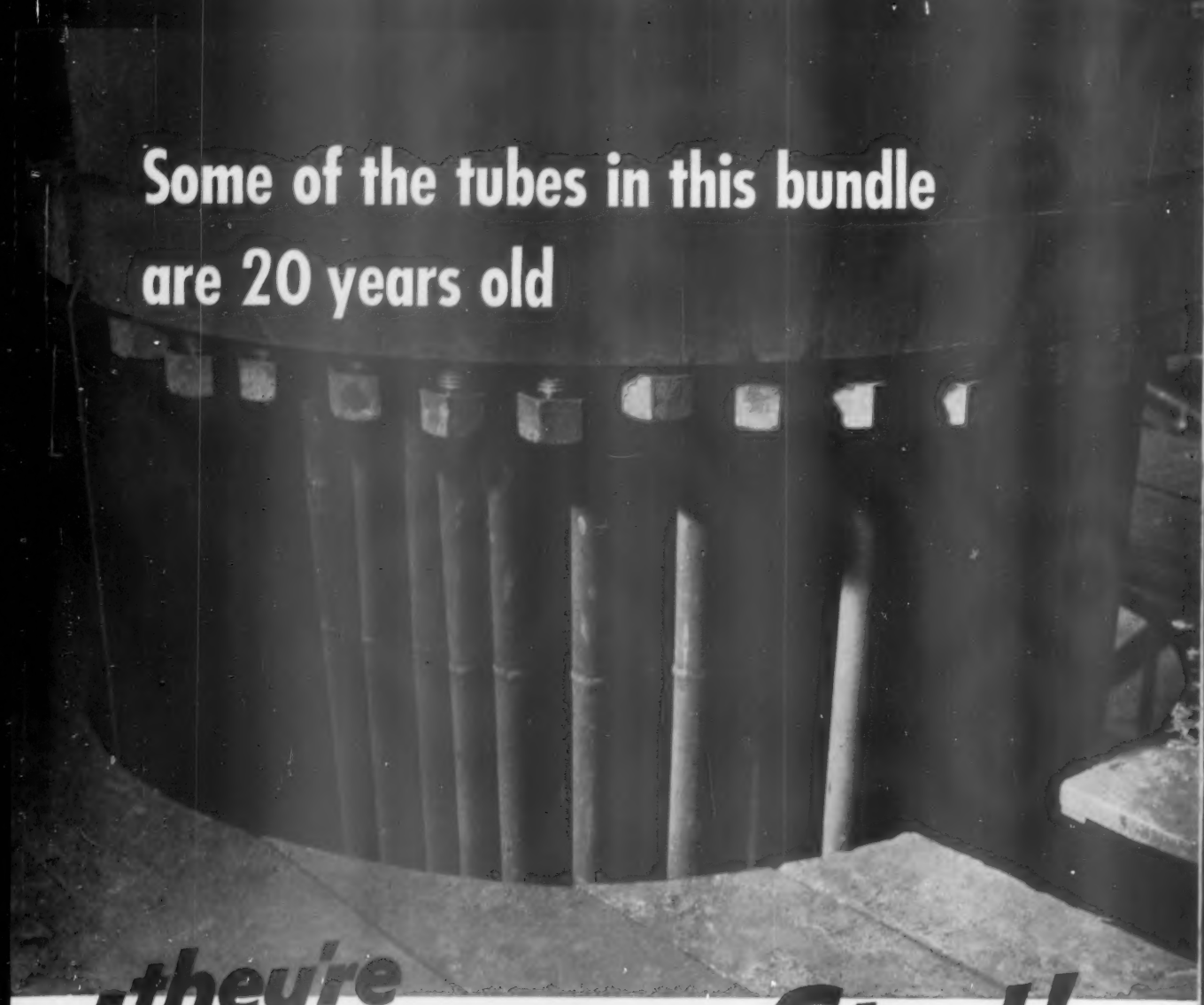

Some of the tubes in this bundle are 20 years old

-they're Stainless Steel!

This particular bundle of heat exchanger tubes is from a Thermal Cracking Unit at a major southwestern oil refinery. Some of these tubes have been handling a variety of corrosive products for more than 20 years. Yet, because they are Stainless Steel, they still get the inspector's "OK."

Stainless Steel's resistance to corrosive media frequently found in the oil made it a logical selection for this job. Its non-fouling tendencies have permitted longer runs, increased throughput, increased yields and decreased downtime.

The durability of these Stainless Steel tubes is proved by the fact that they have been removed, straightened and reinstalled. Some have been lengthened by heliarc welding on short lengths.

This is but one of many examples of the economy of using Stainless Steel in refinery operations. Its excellent corrosion and temperature characteristics, plus the freedom it gives from contamination, make it invaluable in keeping your refinery on stream.

Take advantage of the properties of Stainless Steel, and when you do, be sure it is perfected, service-tested USS Stainless Steel. For extensive data on the performance of Stainless Steels in refinery service, write for our 44-page book. Send your request to United States Steel Corporation, Room 4380, 525 William Penn Place, Pittsburgh 30, Pa.

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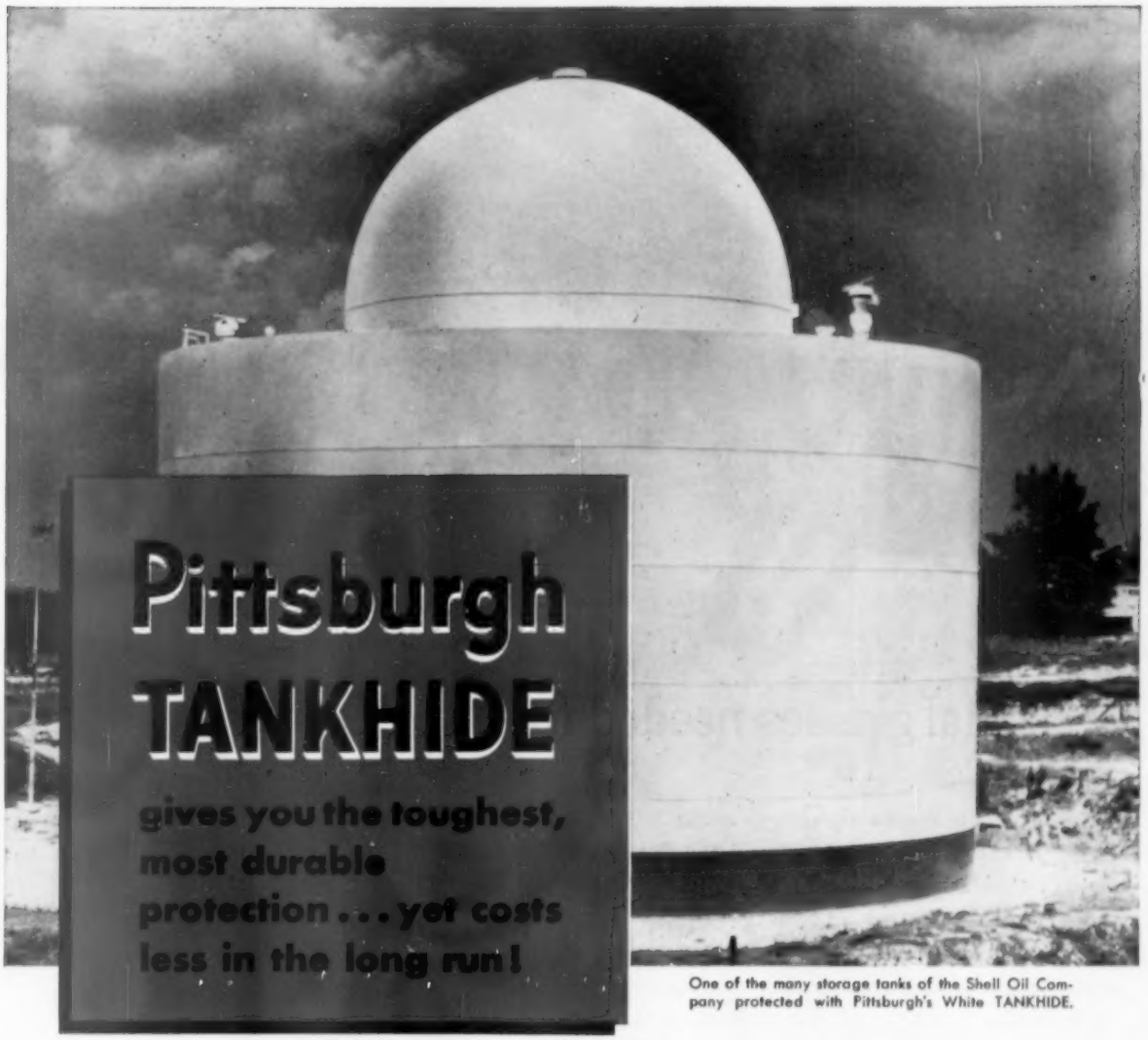

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Besides TANKHIDE, Pittsburgh offers a complete line of high-quality protective coatings for every other need in the petroleum industry. These include production and refinery finishes for towers, pipe lines, buildings and equipment; service and bulk station paints; pump enamels and drum finishes.

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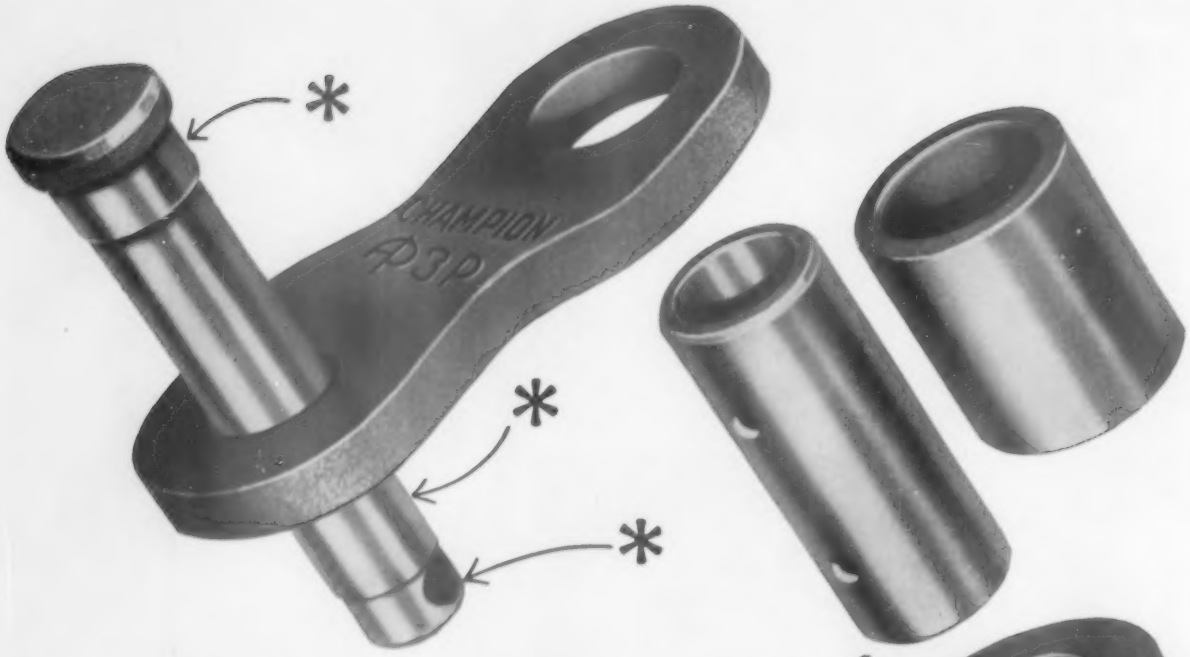

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The motor with side-mounted cooler.

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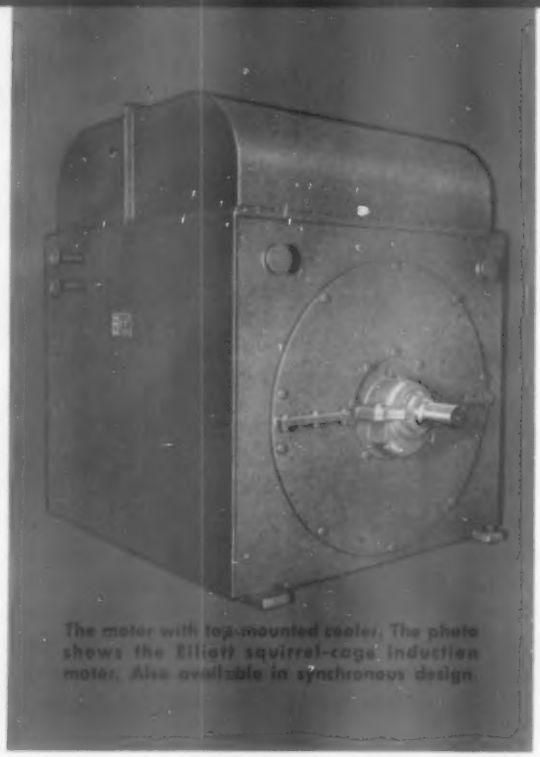
Elliott "Fabri-Steel" construction makes it readily possible to supply these motors in both the types illustrated. The design is basically that of a totally-enclosed water-cooled motor, filled with inert gas or instrument air at .15 psig. Special seals on the shaft prevent gas leakage. Standard equipment includes indicating pressure gauge, low pressure alarm, and pressure regulator. Also, for inert gas, manifold and wall mounting brackets for gas bottles.

Your local Elliott field engineer has full details, or write Elliott Company, Ridgway Division, Ridgway, Pa.



The motor with top-mounted cooler. The photo shows the Elliott squirrel-cage induction motor. Also available in synchronous design.

ELLIOTT Company

R4-8

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KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

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Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

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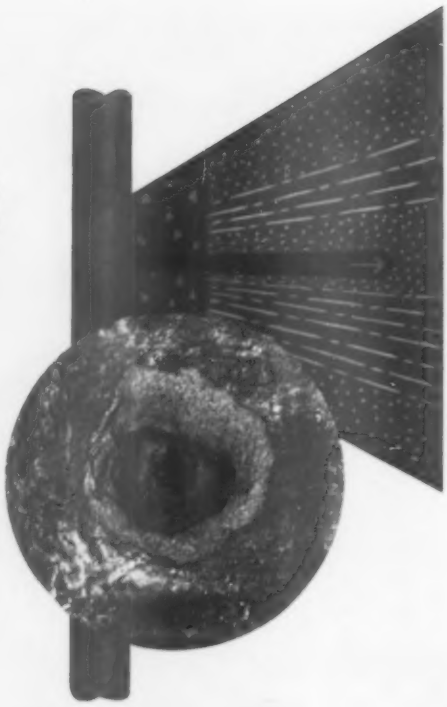

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POZMIX

Here's the new answer to the old cementing problem of *too much initial strength* that prevented deep, effective perforating. Neat cement slurry quickly set into a hard, brittle shield that blocked penetration and often shattered badly. But Pozmix provides an initial period of lower, resilient strength that allows deeper, more effective penetration with only minor, local cracking.

During the period before ultimate strength is reached, Pozmix provides the perfect combination of strength and resiliency. There is ample strength and tight bonding to hold pipe rigidly in the hole, but enough resiliency to permit good perforating. And the lower strength of the Pozmix slurry steadily increases until it may equal or exceed the compressive strength of a neat Portland slurry.

Halliburton's exclusive formula for Pozmix is a unique blend of pozzolanic materials and Portland cement that eliminates many undesirable features of neat Portland. Pozmix has a lower density and lighter weight that minimizes breakdown of soft formations and gives better protection to well casing. Low hydration heat lowers stress while resistance to leaching provides greater impermeability. And Pozmix is particularly effective in combating corrosive waters—even in strong sulfate or brine zones.

Pozmix provides plenty of new answers to cementing problems. And particularly important to you, Pozmix costs less! Not only is the original cost lower, but its lasting strength and water-resistance minimizes the possibility of remedial work. Pozmix is the best answer to so many problems that it's the best answer for your next cementing job. Phone your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

THERE'S AN

EXTRA DIVIDEND IN

STEEL PIPE!

There are plenty of good reasons why you get top-quality pipe when you buy SPANG CW for oil country use. But the very careful steps used to test and inspect SPANG CW Pipe prior to shipping give you an "extra dividend" that pays off in top-quality installations for water systems, air lines, gas lines, water flooding lines, oil gathering systems and salt water disposal lines. Here's what we mean:

TESTING. Each length of SPANG Pipe is subjected to a hydrostatic test, the final check to make sure the weld is sound. Test pressures applied are well above actual requirements.

INSPECTION. Threads and couplings are gauged and measured for length, pitch and quality. Each length of pipe is inspected visually inside and out with the aid of light from fluorescent tubes to be positive that it meets SPANG's high product requirements.

To these two factors add quality steel, automatically controlled furnaces, and the latest developments in mechanized production. Result: consistently good quality pipe, built to stand up under the roughest oil country treatment.

Why just buy any pipe when you can get top-quality SPANG Pipe at no extra cost? Your nearby National Supply Store carries SPANG CW Steel Pipe in a full range of sizes. Take advantage of the "extra dividend" that Spang CW offers you.

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Photo by Offie Lites—Pine Bluff

Diesel engine shed, St. Louis Southwestern R.R. Co., Pine Bluff, Ark. Roof and sides of "Century" Asbestos Corrugated. Erection Contractor: Mound City Erection Co., St. Louis, Mo.

Cotton Belt Railway gets long-lived, low-cost shed of

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ASBESTOS CORRUGATED

This new diesel engine shed will serve the Cotton Belt Railway for many, many years—through all kinds of weather with little or no maintenance ever required. Such service is to be expected of "Century" asbestos corrugated!

This lifetime roofing and siding is made from asbestos fiber and portland cement, and so combines the advantages of both materials. It is strong, dense, and tough; will not burn, rot, or corrode; is maintenance-free, and *never* needs protective paint. It is easy to handle, cut, and erect, too.

Best of all, "Century" asbestos corrugated is one of the most economical materials you can use—low in application cost, low in maintenance expense!

If you are now planning construction for your company, find out more about the many advantages you get with "Century" asbestos corrugated. Write for complete information.

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Nature made asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

BUTTWELD. J&L PIPE .LAPWELD..

A pin oak is a pin oak, but spring may cover one with green leaves before another shows a bud.

Welded pipe is welded pipe . . . but J&L has made things of iron and steel for a hundred progressive years.

There is logical assurance in using Buttweld and Lapweld made to J&L standards.

Our stocks are well balanced. Mill shipments are prompt.

In refinery areas we also stock J&L Seamless Line Pipe, A.S.T.M. A-53 and A.S.T.M. A-106.

J&L STEEL

Jones & Laughlin STEEL CORPORATION

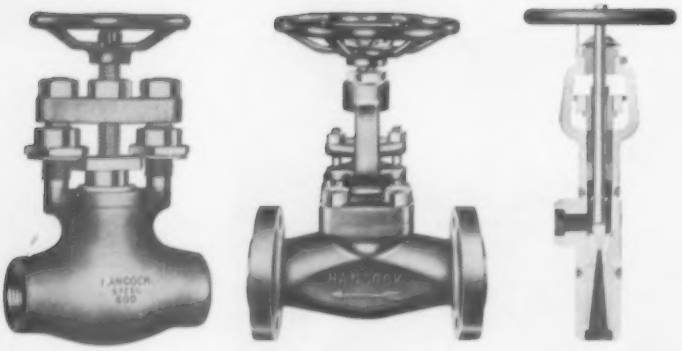
SUPPLY DIVISION – TULSA, OKLAHOMA

Serving The United States and Canada

PESA

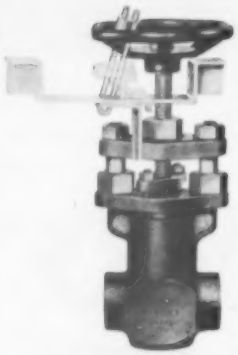
PARTNERS IN PETROLEUM PROGRESS

for the economy of quality...

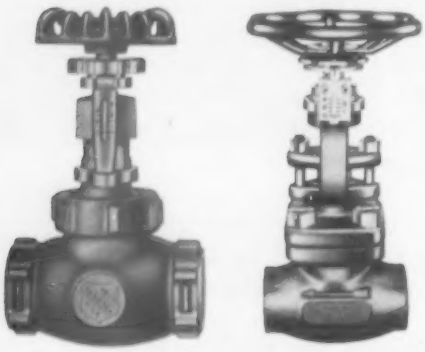


600# through 2500# Hi-Pressure Drop Valves. For continuous blowdown service. Combine orifice, shut-off and index in a single unit. **No Bonnet Joint Design. Sizes:** ¼", 1" and 1½". **Orifice Sizes:** ⅛" minimum; 1" maximum. **Connections:** Screwed or Socket Weld Ends.

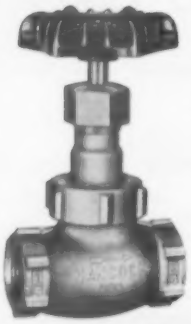
600# Steel Valves. Dependable, trouble-free in the severest services. **Sizes: No Bonnet Joint Design** (left)—¼" through 2". **Bolted Bonnet Design** (right) — 1¼" through 2". **Types:** Globe and Angle. **Connections:** Screwed, Socket Weld and Flanged Ends. **Service Ratings:** For all pressures up to 850 psi at 750° F. — O.W.G. 2000#, 100° F.



Water Column Shut-Off Steel Gate Valves. Combine a simple, positive locking and signaling device. Red flag indicates at a glance whether valve is open or closed. **Sizes:** ¼" through 2". **Connections:** Screwed and Socket Weld Ends. **Service Ratings:** For all pressures up to 800 psi at 775° F.—O.W.G. 2000# 100° F.



"Flocontrol" Valves. 3-in-1 design combines variable orifice, shut-off and index. BRONZE: **Types:** Globe and Angle. **Sizes:** ¼" through 2". **Connections:** Screwed Ends. Available in 150# and 300# series. STEEL: **Types:** Globe and Angle. **Bolted Bonnet and No Bonnet Joint Designs. Sizes:** ¼" through 4". **Connections:** Screwed, Socket Weld and Flanged Ends. Available with 150#, 300# and 600# series flanges.



Bronze Valves. Extra tough for leak-proof service. 125% to 230% stronger diaphragm than ordinary bronze valves. **Types:** Globe and Angle. **Sizes:** ¼" through 2". **Connections:** Screwed Ends. Available in 150#, 200# and 300# W.S.P. ratings. 550° F.

HANCOCK VALVES

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your telephone. Take advantage of his knowledge and experience in selecting the right Hancock Valve for each service requirement. You can depend on him for prompt deliveries from local stocks.

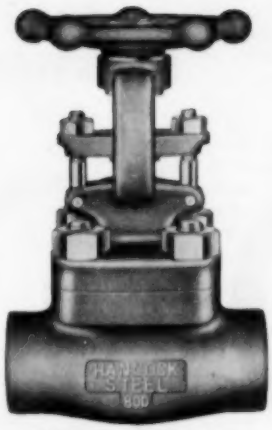
specify HANCOCK VALVES

To get the most value from your valve investment, you must have the assurance of efficient, trouble-free performance.

Hancock Valves give you *economy of quality* that makes them your best buy in terms of long, reliable service. They have advanced construction and operational advantages found in no other valves—features backed by more than 75 years of pioneering new designs, new materials and new manufacturing techniques in anticipation of changing needs.

Rugged, precision-built Hancock Valves are noted for dependable tightness month after month under the most adverse conditions of use. They do a job and stay on the job—withstand the deteriorating effects of wire drawing, galling, steam cutting, erosion and corrosion far longer because they are functionally designed and made from carefully selected materials of the highest quality. Standardization of parts in all sizes of each type of valve provides the interchangeability factor so essential to simplified inventory and low-cost maintenance.

The operational perfection and extra service life engineered into all Hancock Valves are yours at the cost of ordinary valves. Whether you are adding new capacity to present facilities, planning a new plant or a revalve project, learn all the money-saving reasons why Hancock Valves belong in your specifications. Complete information is yours on request.



800# Steel Gate Valve,
Bolted Bonnet Design.

800# Steel Gate Valve,
No Bonnet Joint Design.

800# Steel Gate Valves. More than meet the requirements of process piping systems. **Bolted Bonnet Design. Sizes:** ¼" through 2". Type 950 illustrated at upper right offers these alternate trims: (a) Cobalt-Chromium Tungsten Alloy, Hard Facing—"420 Brinell"; (b) 18-8% Stainless or 20% Nickel, 8% Chrome; (c) Monel; (d) Hastelloy. **Connections: Flanged Ends**—for all pressures up to 800 psi at 775° F.—O.W.G. 1440 psi, 100° F. Screwed and Socket Weld Ends—for all pressures up to 800 psi at 775° F.—O.W.G. 2000 psi, 100° F. **No Bonnet Joint Design. Sizes:** ¼" through 2". **Connections:** Screwed and Socket Weld Ends—for all pressures up to 800 psi at 775° F.—O.W.G. 2000 psi, 100° F.

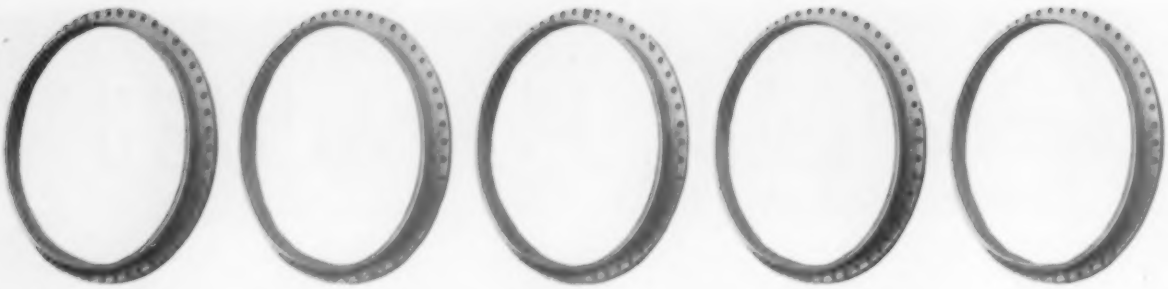
When Hancocks go in, valve costs go down.

1877 HANCOCK U.S.A.

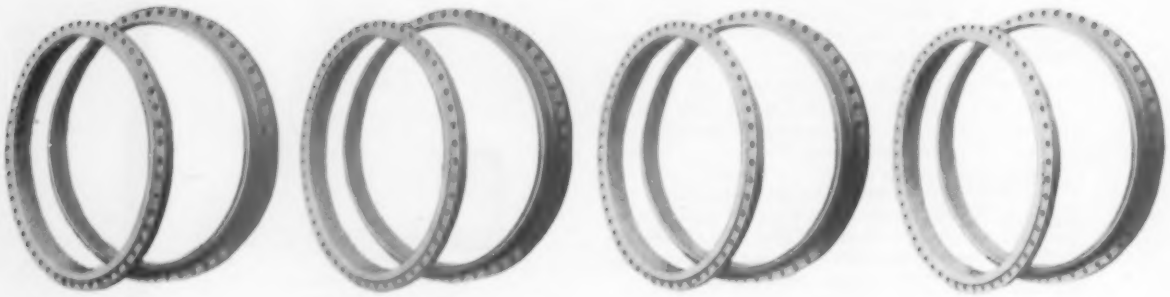
A PRODUCT OF MANNING, MAXWELL & MOORE, INC.

WATERTOWN 72, MASSACHUSETTS

MAKERS OF 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' AND 'AMERICAN-MICROSEN' INDUSTRIAL INSTRUMENTS, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



life savers for your plant



"railway" steel flanges . . . large diameters

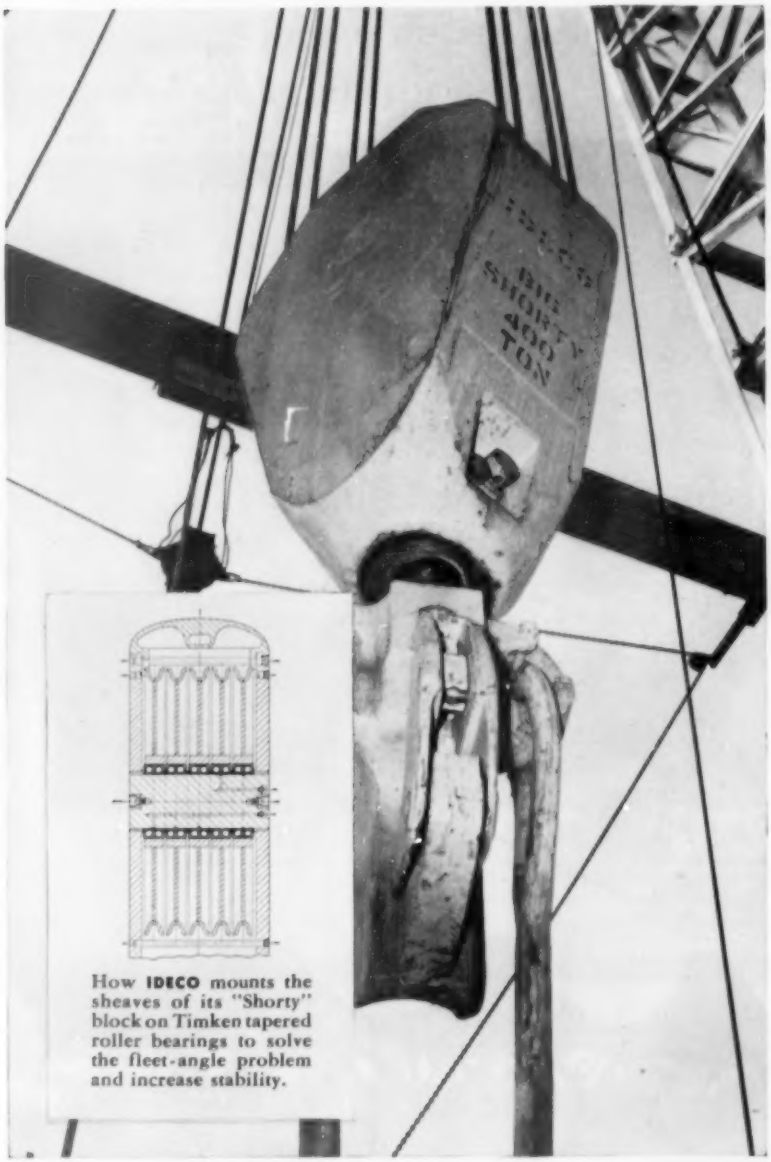
high-quality carbon or alloy steels . . . from 18 in. ID to 150 in. OD

Railway Steel Flanges

RAILWAY STEEL-SPRING DIVISION
AMERICAN LOCOMOTIVE COMPANY

Chicago • Cleveland • Houston • New York • Richmond • San Francisco • St. Louis • St. Paul • Tulsa*
*Ardun Supply Company

TIMKEN® bearings solve the fleet-angle problem, give Ideco's "Big Shorty" block high stability



How **IDECO** mounts the sheaves of its "Shorty" block on Timken tapered roller bearings to solve the fleet-angle problem and increase stability.

TWO years ago, IDECO introduced the biggest member of the Shorty family—the new Big Shorty 400-ton block. To give it outstanding performance, they mounted all the sheaves on Timken® tapered roller bearings.

Fleet angles had always been a problem—but not with Timken bearings. They take all the end thrust developed at *any* fleet angle. That's because Timken bearings take any combination of radial and thrust loads. The Big Shorty has *maximum* stability—and no thrust washers are needed. Moreover the bearings have a narrow spread; the overall width of the block is only 26".

A great advantage of Timken bearings in blocks is their combination of low friction and high load capacity. The sheaves rotate freely and easily even with a full weight of drill string. There's less slippage between sheave and wire line, less wire-line wear.

Timken bearings take heavy loads because they have full *line contact* between rollers and races. Their frictional resistance is low because they have *true rolling motion* and have extremely smooth surface finishes.

Block lubrication can be troublesome but Timken bearings help minimize the problem. They keep the shaft concentric with its housing which makes the closure more effective. This keeps lubricant IN the bearing, keeps dirt and moisture out.

Timken bearings are a sure sign of quality. Always look for the trademark "Timken" stamped on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

WE MAKE OUR OWN STEEL

The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂ THE TIMKEN TAPERED ROLLER ⊂ BEARING TAKES RADIAL ⫿ AND THRUST →⫿← LOADS OR ANY COMBINATION →✳←

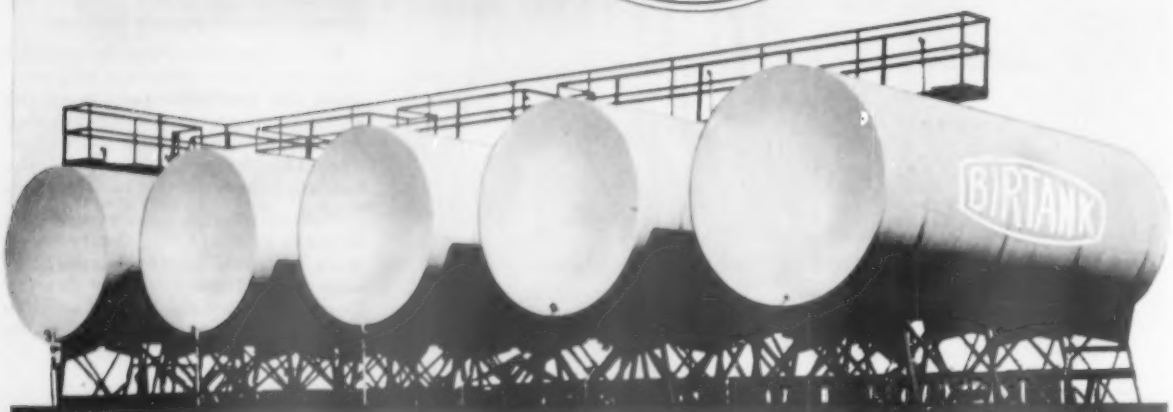
S. S. RABAN—Built by The Ingalls Shipbuilding Corporation for the Texas Company. 402½ feet long, 62½ feet wide.

Ingalls-Built Tankers Serve Ingalls-Built Birtanks

BUILDERS OF:

Tankers • Oil Barges • Marine Equipment • Structural Steel • Oil Drilling Barges • Marine Bulk Storage Tanks • Oil and Chemical Storage Tanks

AN INGALLS BIRTANK PRODUCT



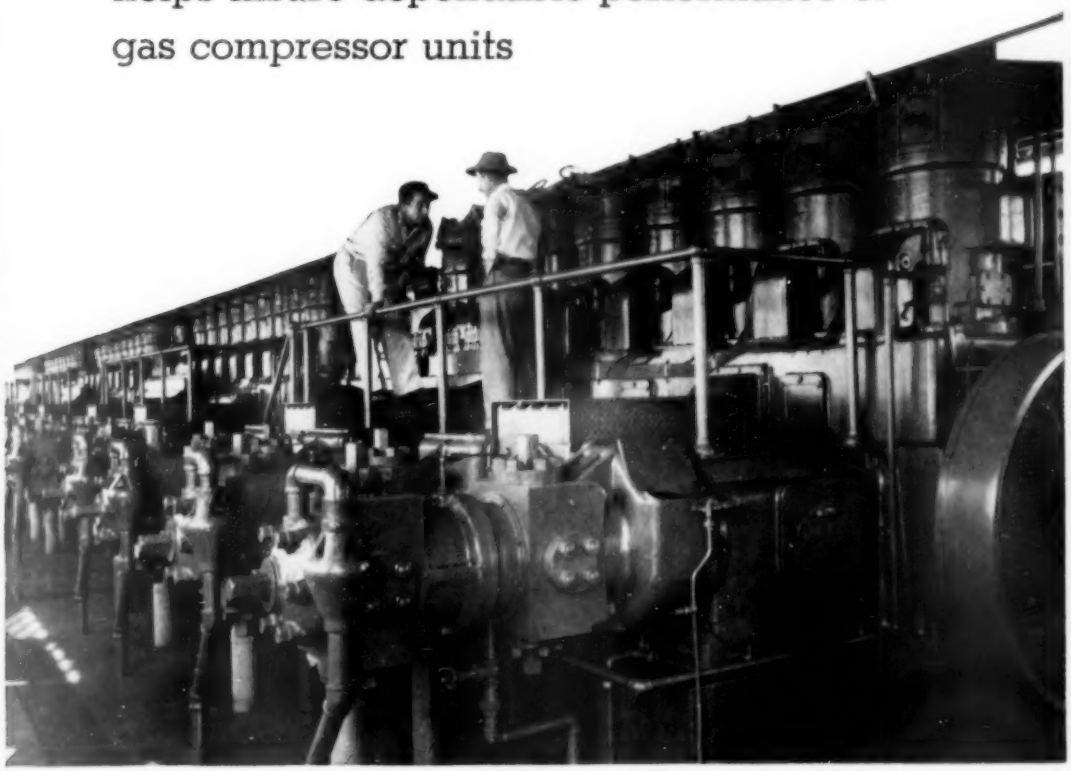
FOR COMPLETE INFORMATION ON BIRTANK WRITE:

TANKS

BIRMINGHAM TANK COMPANY

GULF SECURITY OIL

helps insure dependable performance of gas compressor units



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

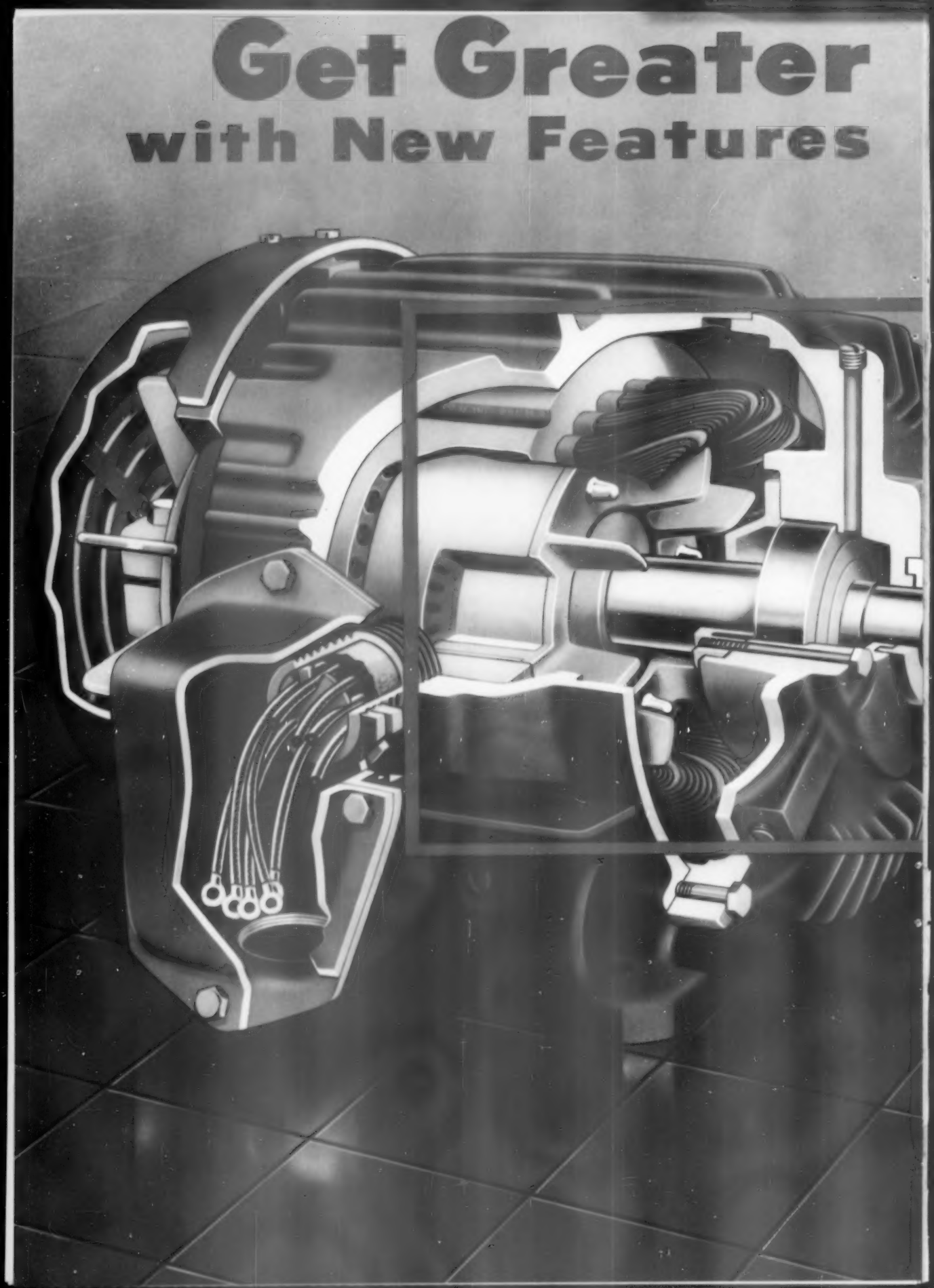
If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF INDUSTRIAL LUBRICATION

Get Greater
with New Features

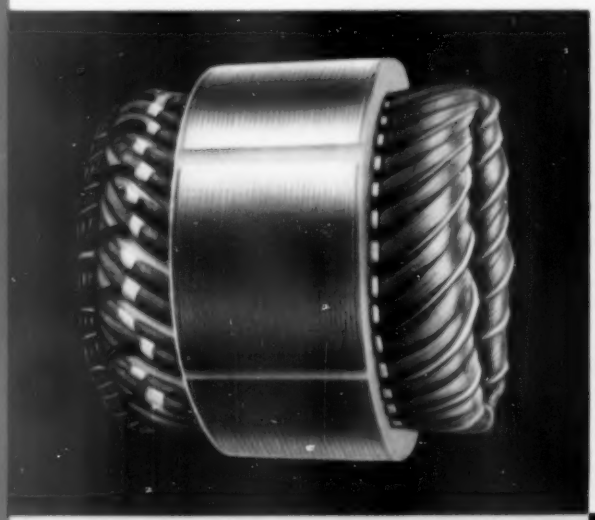


Motor Economy
. . . Proved Principles

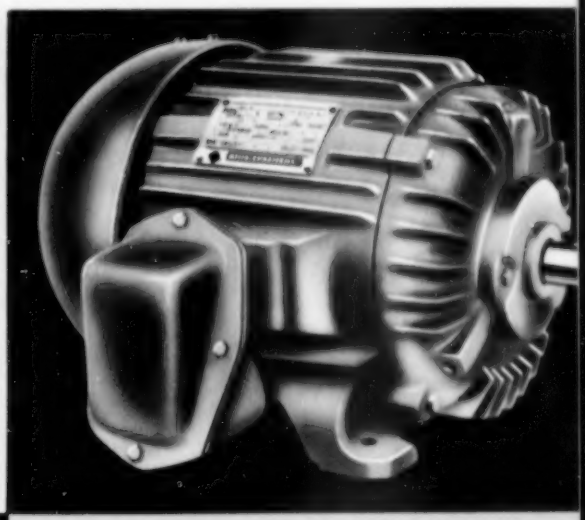
Here's the inside story of a great new motor. It combines the best of the new developments in methods and materials with the best of the tried and proved principles that have made such an outstanding record for Allis-Chalmers motors.

Smaller in size than previous design, it retains the easy-to-clean, fin-type construction which Allis-Chalmers pioneered several years ago. The bearing design gives greater bearing protection, ease of maintenance and long life. Insulation gives you famous Allis-Chalmers rugged dependability.

Consult your nearby Allis-Chalmers Authorized Distributor or District Office on your motor needs. Or write for Bulletin 51B6210.



STATOR DOUBLE INSULATED —Stator laminations are welded across back for rigidity. Heavy varnished cambric insulation is inserted between phase windings. Wound stator is dipped several times in special insulating varnish of proved effectiveness and stamina, and baked after each dip. The Allis-Chalmers stator is both physically and electrically strong . . . thoroughly protected against moisture, heat and corrosion.



FIN-TYPE CAST-IRON FRAME — Proved by years of service. Cooling ribs are cast integrally with the yoke; air is blown over them without restriction. There are no enclosed external air passages to clog up with dirt and thereby ruin cooling efficiency. Radiating surface provides reserve cooling capacity for extra strenuous duty. Cleaning, if required, is a few moments work with an air hose, brush or vacuum cleaner.

Multiple bearing protection keeps grease in... keeps dirt out...permits relubrication in service

Extreme care has been taken to provide longest possible bearing life and lowest possible maintenance costs. The bearing itself is of double-shielded type, which allows controlled migration of grease in and out of the bearing to suit operating conditions. Yet bearing is protected against greatest cause of bearing trouble — overgreasing.

Close running clearances and double labyrinth seals between the shaft and outer bearing housings keep grease in the bearing and exclude dirt. Grease is kept out of the interior of the motor by a bearing cap with a long running clearance along the shaft. The cap is held tightly in place by hex head cap screws. Large grease chambers hold an ample supply of lubricant.

A-4363

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

CLAIMS AND ENGINEERING SERVICE

Responsible for
REDUCTION in.... INSURANCE COSTS

What
POLICYHOLDERS *Say*

This is one of many testimonial letters received from policyholders of the Texas Employers Insurance Association.

Ask the Texas Employers representative nearest you to show you more of these letters, as proof of what Texas' largest writer of Workmen's Compensation Insurance can do for you.

40TH ANNIVERSARY 1914 1954

WE QUOTE FROM A POLICYHOLDER'S LETTER

"Please accept our thanks for the dividend check in the amount of $2,962.24 which you delivered to me today. This cash dividend, together with guaranteed cost discount deducted previously makes a total savings of 43.6 percent on our workmen's compensation insurance.

"It will be appreciated if you will express our appreciation to your claims and engineering departments for the fine service they have rendered us. The service of your safety engineer together with the promptness in which our claims have been handled are in a big way responsible for this nice reduction in our insurance cost."

Largest Writer of WORKMEN'S COMPENSATION INSURANCE *in Texas*

HOMER R. MITCHELL, *Chairman of the Board* A. F. ALLEN, *President*

Service Offices: ABILENE • AMARILLO • AUSTIN • BEAUMONT • CORPUS CHRISTI • DALLAS • EL PASO • FORT WORTH • FREEPORT • GALVESTON • HARLINGEN • HOUSTON • LUBBOCK • MIDLAND • ODESSA • PORT ARTHUR • SAN ANGELO • SAN ANTONIO • SHERMAN • TYLER • WACO • WICHITA FALLS

TEXAS EMPLOYERS INSURANCE ASSOCIATION
HOME OFFICE - DALLAS, TEXAS

TRI-CLAD* VERTICAL explosion-proof motors, like these belonging to Pan American Pipe Line Company and located adjacent to Rancho Pipe Line System's Eldorado Station, are available to suit the requirements of the pump mounting. This is just one of G-E's complete line of pipe-line motors.

TOTALLY ENCLOSED EXPLOSION-PROOF motors have been tested and listed by Underwriters' Laboratories for Class I Group D hazardous locations. Like this one at Sinclair Pipe Line Company's Clinton Station, they withstand all weather conditions, do not require firewall.

G-E Pipe-line Motors Can Help You Reduce Your Maintenance and Inspection Costs

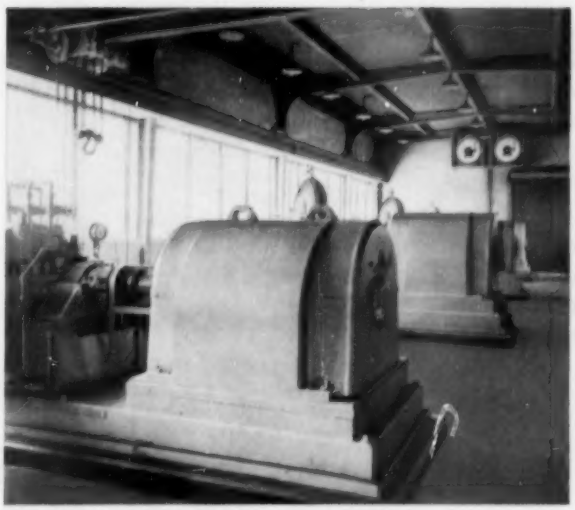
For the vital, continuous service which pipe line pumping requires, specify G-E motors. You can install them in your isolated stations and forget them for months at a time—because their rugged construction and high quality materials are designed specifically for long, dependable life in pipe-line service.

Wide selection offered by G.E. assures you the best motor for the job. For special applications, G.E. has the engineering experience necessary to design and build motors to meet your special requirements.

G.E.'s application and field engineers can serve you as a staff of experts on all your electric pipe-line equipment—to give you a co-ordinated, well-balanced system. And no matter where your pipe line reaches, you'll find G-E sales and service facilities all along its path to help you keep your throughput at a maximum under all conditions.

For more information, contact your G-E Apparatus Sales representative. *General Electric Company, Schenectady, N. Y.* 890-2

*Reg. trademark of General Electric Co.



BASE-VENTILATED MOTORS up to 3000 hp may be force-ventilated like these at Rancho Pipe Line System's Garfield Station. Separate blowers are started in advance to purge motor and duct system.

GENERAL ELECTRIC

DARLING VALVES

What's *SURER* valve performance worth to you?

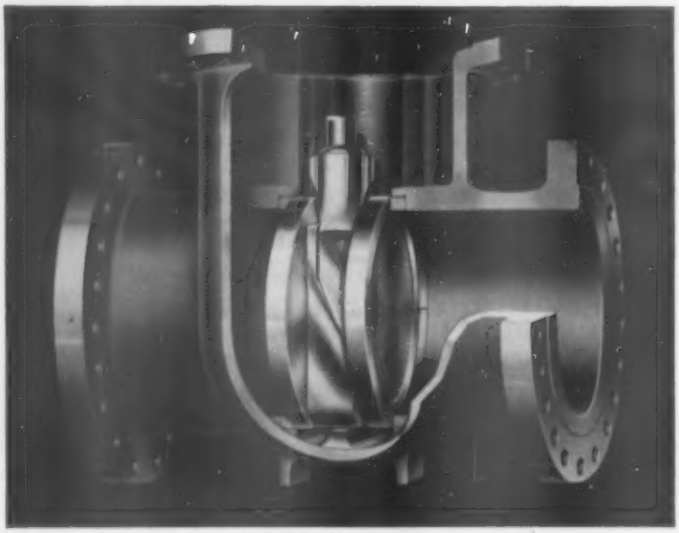
IN your service, the thing about valves that costs the most is down time. Right? And sometimes even *preventive* measures are pretty costly, too!

All right, here's a fact that Darling gate valve users everywhere will vouch for. The Darling *fully revolving double disc, parallel seat principle* means *easier* operation, *surer* closure, less chance of trouble, month in, month out. And you'll save on maintenance all along.

Why not check into Darling gate valves for your requirements? Find out *how* they assure these advantages. We'll gladly furnish general or specific details. Just say the word.

Above top: Darling 30" motor-operated gate valve powered by gas from line pressure.

Cutaway, below, shows simplicity of Darling's unique fully revolving double disc parallel seat gate valve principle—just four simple working parts—two plain interchangeable no-pocket discs and two husky wedges.



DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

R/M packings for high temperature valves require less adjusting

R/M Packings No. 303 and 1326-J require less adjusting, because they are specially engineered to have a low volume loss—they won't burn out or shrink at high temperatures and pressures. They have exceptional heat resistance, because they are made of asbestos yarn which contains only the barest minimum of organic (burnable) materials—just enough for fabrication. And also because they have superb lubrication. Their lubricants are ground in during manufacture and become an integral part of the packing. These packings have exceptional pressure resistance. No. 303 is further reinforced with Monel wire.

With R/M Packing No. 303 and/or No. 1326-J you can meet every one of your high temperature valve stem packing needs —and look for fewer adjustments, less downtime. For complete information, write today.

R/M No. 303 for valve stems up to 900°F.
R/M No. 1326-J for valve stems up to 600°F.
and for expansion joints.

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS—AVAILABLE FROM YOUR R/M DISTRIBUTOR

R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

A Controlled Fire Hazard

CATALYTIC CRACKING UNITS

FRACTIONATION SECTIONS

PUMPING STATIONS

PUMP ROOMS

EXTRACTION UNITS

BUTADIENE TANK FARMS

Count 'em — seven propane storage tanks — a potential disaster area for most petroleum properties. Not so at this large refinery though. "Automatic" FIRE-FOG is ready at all times to detect and extinguish the smallest blaze before it becomes a large one — before it shuts down operations, damages equipment, reduces profits.

Many installations of ENGINEERED "Automatic" FIRE PROTECTION have been made in refinery and petro chemical properties throughout the Western Hemisphere and the record speaks for itself: "Complete control of fire within protected areas — in seconds!"

If you're the one responsible for plant safety and continuity of production, we'd suggest an early review of your fire hazard safeguards. Then, whether your needs call for protection by means of "Automatic" Sprinklers, water spray, chemical or mechanical foam, carbon dioxide, or dry powder, we'll gladly provide, at no cost to you, preliminary engineering service. Through this you'll be able to evaluate the economic and adaptability features of each method of protection for your own risk.

Write or call us today for an appointment with a "Safety First" future.

"Automatic" Sprinkler CORPORATION OF AMERICA YOUNGSTOWN, OHIO

Offices in Principal Cities of North and South America

They Say—

The Future Looks Good

"There is a lot of new oil business ahead. We estimated that our company alone will need to increase its output each year — for how many years I don't know—by about 80,000 bbl. per day. Such an increase of production by our affiliates is required merely to maintain their present position in the business—just to keep up with growing demand for oil products. It doesn't take into account our efforts to win a greater share of the total business.

"... It probably costs about $4,000 to do everything necessary to produce 1 bbl. per day of new oil products ...

"... Although the petrochemical end of the domestic oil industry is three times as big today as it was 10 years ago, the potential is still enormous ..."

M. J. Rathbone, president of Standard Oil Co. (N. J.), in an address before the National Press Club, Washington.

Cooperate With All

"... It is perfectly simple to cooperate with those above you since that is not only expected but demanded, but have you ever given thought to the fact that cooperation laterally, if I may use the term, invariably makes you more valuable to the man above you and in turn to the whole organization ...

"The incentive to move upward is present in nearly all of us, but in following that incentive one is not required to move upward at the expense of pushing others downward ..."

George T. Naff, president of Texas Eastern Transmission Corp., in an address made at Norman, Okla., during the Southwestern Gas Measurement Short Course of the University of Oklahoma.

Astounding and Costly

"... Preliminary estimates by the A.P.I. subcommittee on corrosion indicate the petroleum industry's corrosion bill to be about $280 million annually in this country.

"Astounding as it may sound, a large refinery (200,000 bbl. daily) can suffer

ALL'S WELL

. . . when you give Beacon the job of marketing your petroleum products..

Today the job of marketing petroleum products demands a fast-moving, highly-organized and experienced staff to meet the requirements of both the industrial and domestic markets . . . Beacon is in a position to keep things running smoothly for producers and refiners by providing more and bettter outlets for petroleum products . . . to also keep things running smoothly for dealers by providing a reliable source of supply the year 'round . . . Yes, when you look to Beacon, you can confidently say, "ALL'S WELL".

BEACONGAS

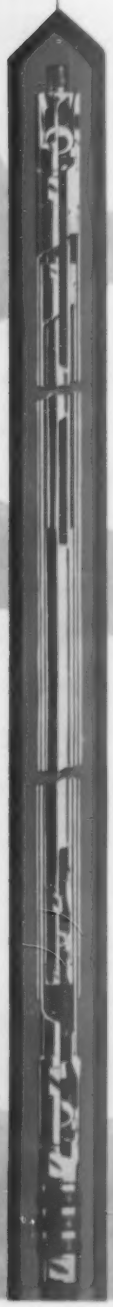
BEACON PETROLEUM COMPANY

TULSA • HOUSTON

MARKETERS OF NATURAL GASOLINE, BUTANE-PROPANE, MOTOR FUEL, FUEL OILS

for sand, abrasion, high temperatures

This all-around pump is particularly efficient in abrasive, sandy, or dirty fluids, and in wells with unusually high bottom-hole temperatures which cause unequal expansion of metal plungers and barrel tubes with critical fits.



The "fluid seal" principle in the design offers a number of advantages over conventional rod pumps: The free-falling plunger and small bore subject the rods to less stretch and strain . . allow pumping at a greater strokes-per-minute rate; plunger friction and working parts wear are negligible. The valves are fitted with standard A.P.I. size balls and seats; no special sizes are needed. A no-go ring on the standing valve seals off the seating area immediately above the hold-down, an important feature for sandy wells.

12', 15', 18', and 25' pumps in 2" x 1¼" and 2½" x 1¾" sizes are available from leading stores throughout the oil country. Illustrated literature on request. Harbison-Fischer Mfg. Co., 2501 Virginia St., Post Office Box 127, Fort Worth, Texas.

H-F 3 TUBE ROD PUMP

HARBISON-FISCHER
FORT WORTH, TEXAS

corrosion losses to the extent of $7 to $8 million a year. It is no wonder that a tremendous incentive exists to do something about this costly wastage of materials.

"A large share of these losses can be attributed directly to exchanger corrosion. Past reports indicate that annual refinery exchanger maintenance costs have been as high as $400,000."

J. D. Munro, Standard Oil Development Co., in an address before the mid-year meeting at Houston of the Division of Refining of the American Petroleum Institute.

Gasoline Stocks Not High

"As we proceed through the fifth month of the year, the pattern of profitable operations remain intact. Competition grows progressively keener, but we see nothing in sight at present to indicate that 1954 will not be another year of good business for Sinclair . . .

"Available stocks of gasoline are undoubtedly not as great as statistical figures might indicate. We know that this is true of Sinclair. Stocks are customarily reported to the public on a gross basis, that is to say, they include large and continuously increasing amounts of products not actually available for sale . . . Discounting necessary working stocks thus tied up in new facilities, the company's inventories are no greater than they were several years ago."

P. C. Spencer, president of Sinclair Oil Corp., at an annual meeting in New York.

Market Target Is Growing

"Our forecasters tell us they are being conservative when they estimate that in 1964 some 65 million vehicles will be consuming 55 billion gallons of gasoline. Compare this with the 43 billion gallons consumed by 55 million vehicles in 1953. If that extra 12 billion gallons of gasoline 10 years from now isn't a target worth shooting for, I don't know what is."

Williard W. Wright, general sales manager for Sun Oil Co., at the annual meeting in New York of the Empire State Petroleum Association.

Thinking of the Employes

"While we cannot promise all of you jobs equivalent to those you have now, we can and do promise that every physically qualified company employe at Olean who wants a job will be of-

at both Brownsville and New Orleans

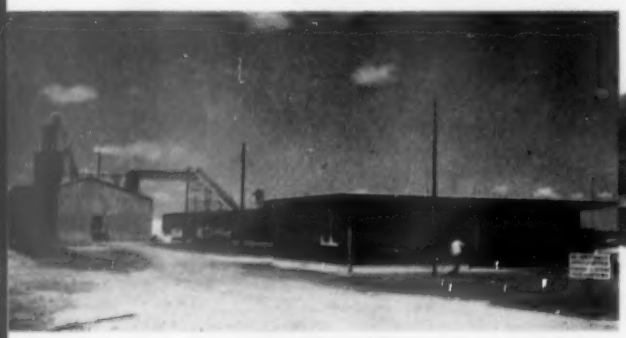
Magcobar Processes Barite Aggregate For Immediate, Low Cost Barge or Bag Shipment to Pipeliners

Magcobar Brand Barite Aggregate is the superior weight material for coating pipe for river crossings, marsh, swamps, and at sea. Barite-Aggregate holds the pipe down while protecting it. River clamps are not necessary. The same Barite Aggregate that *protects* your pipe *holds it* down.

The Magnet Cove Barium Corp. is one of the world's largest producers of barite, and Magcobar Brand is mined and processed in our own facilities, subject to rigid laboratory control. Its guaranteed specific gravity of 4.25 is your assurance of uniform high weight per unit volume. Magcobar Brand Barite Aggregate is available at our New Orleans plant on the Industrial Canal and at our Brownsville plant near the deep water port of that city. Barge loading facilities are available at both locations.

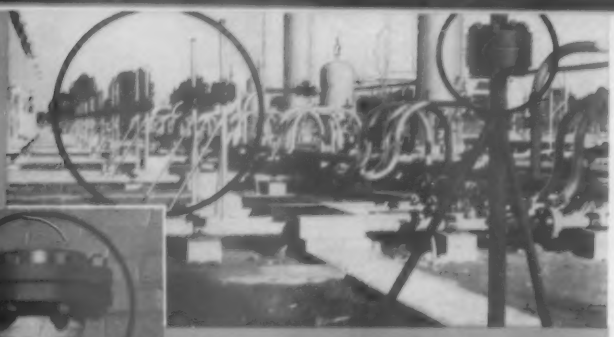
For price quotation or further information write or call Industrial Sales Division, Magnet Cove Barium Corp., P. O. Box 6504, Houston 5.

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS
ONE OF THE DRESSER INDUSTRIES

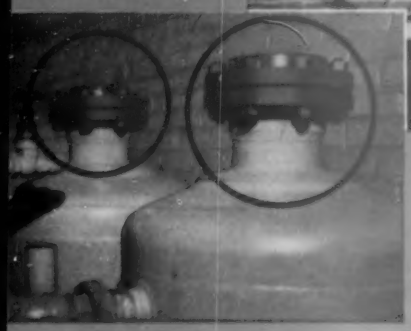


Magcobar's Brownsville plant, above, offers excellent facilities for the entire western Gulf Coast area. The New Orleans plant, right, is near the marshy and swampy country where pipe coating is required. Quick service by rail, truck, and barge is offered from both plants.

Magcobar

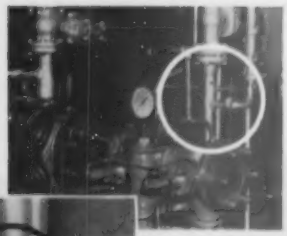


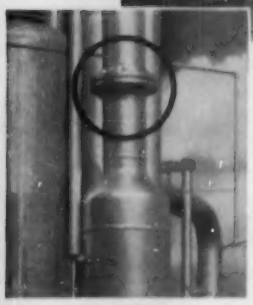
BS&B Safety Heads protect compressor lines at a South Texas condensate recovery—pressure maintenance plant.



Equipment and personnel within a plant are protected from the hazards of overpressure in these vessels by BS&B Safety Heads.

BS&B Safety Heads Have Hundreds of Applications!



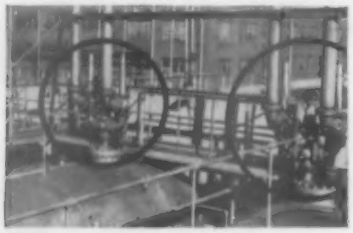


Here a BS&B Union Type Safety Head, with Monel rupture disc, is installed on a two-stage hydrogen compressor.

This BS&B Safety Head is mounted on the flare from a Pop Valve on an incoming gas line.

The variety of possible uses for BS&B Safety Heads is limited only by the number of different ways in which compressed air, gas or liquids—either bland or corrosive—are handled, processed or stored by our many manufacturing and processing industries! Wherever protection of a closed pressure system is required, there is a correct size and type of BS&B Safety Head to do the job! For detailed information, ask your BS&B Representative . . . or write to us direct.

THE "CIRCUIT-BREAKER" OF
Any Pressured System



BS&B Combination Safety Head—Relief Valves protect 15,000 gallon butadiene storage tanks at an Akron, Ohio, rubber plant.

BLACK SIVALLS & BRYSON, INC.
Safety Head Division, Dept 2-A6
7500 East 12th St., Kansas City 26, Mo.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

fered one either at Ferndale or at one of the company's 11 other refineries.

". . . To help you make up your minds about moving to Ferndale . . . four or five of you from among those who may be interested in relocating there will be given an opportunity within the next week or so to visit the Puget Sound area with your wives to see what it is like and to report your observations to your fellow employes upon your return."

George S. Dunham, Socony-Vacuum Oil Co.'s director in charge of manufacturing, in a statement issued after the company announced plans to close its Olean refinery to coincide with the opening of a refinery at Ferndale, Wash.

Competition and Prices

"High taxes on gasoline hide from the public the real job the petroleum industry is doing in keeping the price of gasoline low—amazingly low . . .

"Vigorous, healthy competition in the oil fields, in petroleum transportation, and in refining and marketing provides an abundance of gasoline to the retail market . . .

"Competition, not the lack of it, makes for uniform gasoline prices."

C. Z. Hardwick, executive vice-president of Ohio Oil Co., in an address before the petroleum section of the Special Libraries Association convention in Cincinnati.

Foreign or Domestic Quota?

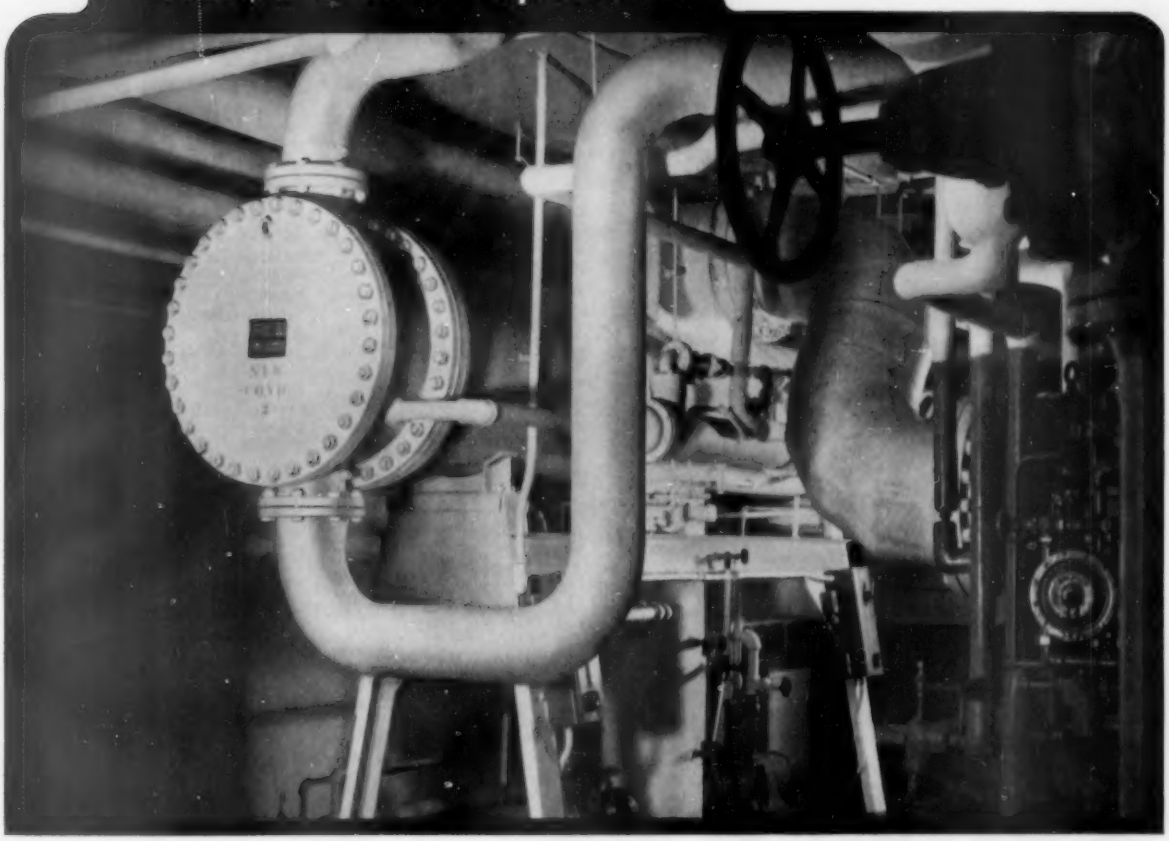
"In meeting the competition created by excessive imports, we are made to realize that we are competing with wells that produce 6,000 bbl. daily while the average production of wells in Texas is only 19 bbl. a day.

"While all thoughtful persons in the industry recognize that it is not desirable to write rigid import quotas into the law, we certainly are made aware that neither is it desirable for the domestic industry to be put upon a 17-day quota.

"We have reached the point where we are faced with the alternative of a quota either for production abroad or for production at home. And certainly there can be no doubt about which is the best interests of our country."

Walter S. Hallanan, president of Plymouth Oil Co., at the annual meeting in Pittsburgh.

Here's a K-R Report . . .



on the Dun & Bradstreet Building's Surface Condenser Installation

Condensing exhaust steam from a 585 hp Worthington turbine which drives a centrifugal refrigeration compressor, this Ross Surface Condenser is an important component of the air conditioning system in the new Dun & Bradstreet Building, New York City. There are two of these Ross units in service.

Dun & Bradstreet, Inc. is another important name in the long list of renowned companies which the Kewanee-Ross organization is privileged to serve. Everywhere, in industries and public utility power plants throughout the world, Ross Surface Condensers rate high . . . *and have for years!*

Long a leader in the surface condenser field and famous for its many noteworthy design improvements, Kewanee-Ross is today in the best position of its history to meet your requirements. With recently expanded manufacturing facilities . . . with two large plants to serve you now . . . Kewanee-Ross is ready to engineer, fabricate and deliver *exactly* what you need in surface condensers.

You will be impressed with the facts and figures that will come out of a brief consultation with a Kewanee-Ross engineer. Arrange a date, *at your convenience*, soon.

ROSS

SURFACE CONDENSERS

KEWANEE-ROSS CORPORATION

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

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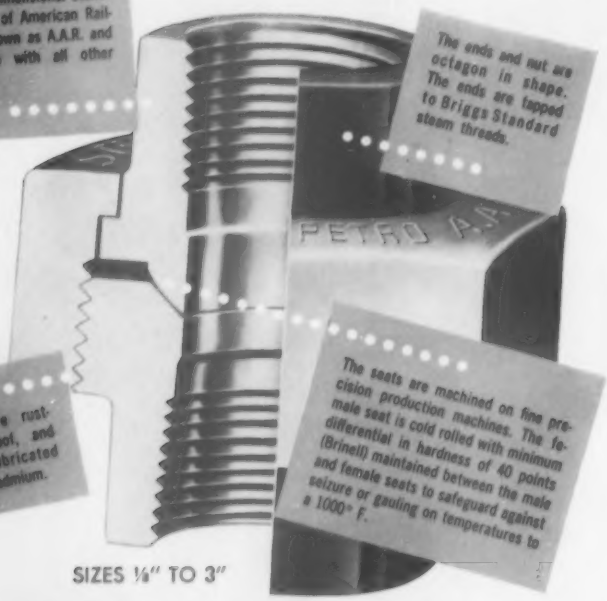
PERMANENTLY LUBRICATED...

WITH UDYLITE CADMIUM TO GIVE LONGER SERVICE AND TO AFFORD QUICK AND ECONOMICAL MAKE AND BREAK

Petro Unions conform to a recognized American dimensional standard (Association of American Railroads) better known as A.A.R. and will interchange with all other A.A.R. unions.



The ends and nut are octagon in shape. The ends are tapped to Briggs Standard steam threads.

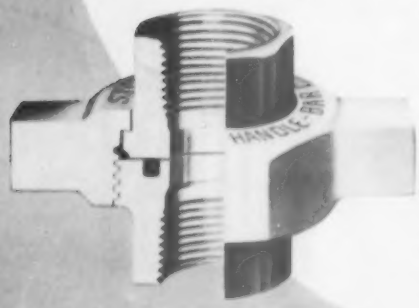
Nut threads are rust-proof, spark-proof, and permanently lubricated with Udylite Cadmium.

The seats are machined on fine precision production machines. The female seat is cold rolled with minimum differential in hardness of 40 points (Brinell) maintained between the male and female seats to safeguard against seizure or gauling on temperatures to a 1000° F.

SIZES ⅛" TO 3"

PETRO A.A.R.

This union is hot-forged of A.I.S.I. 1023 open hearth, silicon killed forging steel. It meets all chemical specifications for forged steel pipe fittings. It is rated for temperatures from 100° below zero F. to 1000° above zero F. and on pressures 900 S.W.P. and 3000 lbs. C.W.P.



"O" RING HANDLE-BAR

QUICK TYPE UNION

These unions do not depend on compression or force, as the terms relate to common gasket type unions. A positive pressure is affected with a synthetic oil-resistant "O" Ring set in a groove between two mating surfaces. "O" Ring, although replaceable, will not drop out when union is disconnected.

For additional information about these and other Forged Steel Unions write to Department C, or refer to listings in Composite and Refinery Catalogs.

ORDER BY TRADE NAME FROM YOUR LOCAL SUPPLY STORE

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

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CALENDAR

JUNE

13-18 American Society for Testing Materials, annual meeting and exhibit, Sherman and Morrison Hotels, Chicago.

14-17 Twenty-sixth annual confrence and exhibit, Oil and Gas Division of the American Society of Mechanical Engineers, Hotel Muehlebach, Kansas City.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

17-19 National Oil Scouts and Landmen's Association, annual meeting, New Orleans.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

28 July 4 Seventh annual Conferences on Personnel Administration and Managerial Development, Industrial Relations Section of the California Institute of Technology, California Institute of Technology, Pasadena, Calif.

21-25 Gordon Research conferences, conference on petroleum, Colby Junior College, New London, N. H.

24-25 Western Petroleum Refiners Association, regional meeting, Leonard refineries auditorium, Alma, Mich.

27 July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

JULY

13-14 Western Plant Maintenance Conference, Ambassador Hotel, Los Angeles.

15 Southern Gas Association, conference on radio communications for pipelines, Adolphus Hotel, Dallas.

16 Southern Gas Association, dispatchers' conference, Adolphus Hotel, Dallas.

29-31 Wyoming Geological Association, ninth annual field conference, Casper, Wyo.

AUGUST

13 Southern Gas Association, conferences on pipeline operations and pipeline engineering, Rice Hotel, Houston.

16-18 Society of Automotive Engineers, West Coast annual meeting, Statler Hotel, Los Angeles.

20 Southern Gas Association, conferences on natural-gas gathering and natural-gas processing, Captain Shreve Hotel, Shreveport.

23-25 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

SEPTEMBER

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

8-10 Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.

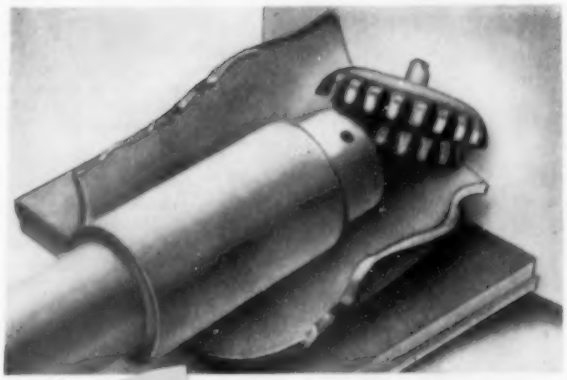
9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

13-14 Independent Natural Gas Association

Now the Welex FORMATION FRACTURING TOOL Gives You the POWER You Need For EFFECTIVE Down-Hole Junk Shots



BEFORE *the muzzle of the Formation Fracturing Tool is placed against one cone of a three-cone rock bit simulating a common well condition.*

AFTER *shown immediately after firing only one shot with the powerful new Welex Tool. All that remains of the cone are small, easily-removed particles.*

Avoid days of expensive fishing, drilling, or milling by using the Welex Formation Fracturing Tool on your next junk job. It gives you hundreds of thousands of foot pounds of energy that you can direct *exactly* where you want it — right at your obstruction. This remarkable new tool is placed right on the junk, plug, or packer that you want removed. It delivers its full force in a hammer blow of a powerful missile traveling at a muzzle velocity of over 4,000 feet per second.

Your obstruction is quickly removed at a minimum of time and cost. The resulting junk is small and easily handled by a sand pump or other standard clean out equipment. And, as all the power of the Formation Fracturing Tool is directed straight down the well bore, there is little or no damage to the wall casing. Call for the Welex Formation Fracturing Tool for your next junk shot.

Also, use the Formation Fracturing Tool whenever you have production troubles in tight formations. Fired with a directional channel, the tool's missile penetrates *feet* into the formation with extensive fissuring. Combined with a large diameter entrance hole, it's a "must" before any acidizing or pressure fracturing job where you want to insure that your fluid gets back into the formation.

Call Welex and be Sure!

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SET 368A-M-B

—covers widest range of wrench operations

By far the widest range of nut turning operations, in both production and maintenance, are covered with this Master Wrench set—½" drive, wrench sizes from ⅜" to 1¼". With this set your men have at their finger tips every combination of handle, adaptor, extension and socket to speed any job in this wrench size. On job after job you get the pay-off of Snap-on's superior speed, flexibility, durability. The sturdy Mechanikit chest has tote-tray and drawers for orderly tool arrangement and safekeeping. Available through your nearby Snap-on branch. For Snap-on industrial catalog and 104-page general catalog of hand and bench tools, write—

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*Snap-on is the trademark of Snap-on Tools Corporation.

of America, annual meeting, Roosevelt Hotel, New Orleans.

15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.

28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.

30 Southern Gas Association, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.

4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.

4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.

6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

7-8 American Institute of Mining and Mettallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Biltmore Hotel, Los Angeles.

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.

14-17 Permian Basin Oil Show, Odessa, Tex.

17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.

24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.

26-27 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

NOVEMBER

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.

2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.

Fast Welding
Field welding 12¾" Electric Resistance Weld Line Pipe near Bartlesville, Okla.

Easy Bending
Bends are easy to make in the field—as shown in this line of 10¾" Electric Resistance Weld Pipe near Cushing, Oklahoma.

Straight Lengths
26" Republic Electric Fusion Weld Line Pipe being laid near Petersburg, Ohio.

SAVE
PIPE LINE INSTALLATION TIME

It's easy to do—with pipe that *comes in straight lengths, bends easily, welds rapidly.* And pipeliners know that Republic Electric Resistance Weld and Electric Fusion Weld Line Pipe do all three. That's why so many thousands of miles of both are being used all over the world.

Line pipe that is dependably straight speeds up production. Delays are avoided. You get constant circumference, too. That means no difficulty lining up field joints. Result: the entire circumference is welded at top speed. And because uniform wall thickness assures even distribution of metal all around the pipe, a good weld is assured.

High ductility permits smooth, uniform bends to be easily made in the field. And you can build high pressure lines with Republic Line Pipe due to its uniform high yield strength.

Remember: to save time and money, specify Republic Line Pipe. We make three types: Electric Resistance Weld from 2⅜" through 16" O.D.; Electric Fusion Weld from 24" through 30" O.D.; also Continuous Butt Weld Pipe for gathering and distribution lines from ⅛" through 4" nominal. Write for more facts.

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GENERAL OFFICES • CLEVELAND 1, OHIO
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• W. C. NORRIS SWAGED NIPPLES AND BULL PLUGS are forged to exact size from seamless pipe before threading. They are available in standard, extra heavy and double extra heavy weights.
• W. C. NORRIS SWAGED NIPPLES AND BULL PLUGS are Norrisized* for rust and corrosion prevention, threads are colored for instant identification, packed in cartons to insure perfect delivery.
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*Electrogalvanized
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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Eating Oil

WE are secretly an inventor in our spare time (we inherited our genius from an inventor uncle) and just the other evening, right in the middle of a TV soap opera, we were struck with a Great Idea. It's this: Oil can feed the world; oil can literally be turned into food, thus banishing the fear of starvation and eliminating the back-breaking labor of tilling the soil.

Just to show you how we inventors operate, we'll retrace the events leading up to the generation of our Great Idea. During the TV commercials we had been reading a magazine article about experiments with making food out of algae, the green scum that grows in ponds. The article mentioned in passing that algae feed on nitrogen and carbon dioxide.

Now it so happened that just the week before we had gone through a petrochemical plant which turns natural gas into nitrogen and carbon dioxide, among other things. Now do you begin to see how the pattern of our Great Idea unfolds?

It's very simple: You take oil or gas, bust it up into nitrogen and carbon dioxide, and dump it into tanks of algae. Then you just skim off the green goo, compress it into cakes or powder, season to taste, and package it as concentrated soup, synthetic beefsteak, or imitation pistachio ice cream.

So petrochemical plants can produce all our food and solve the farm problem. Instead of trying to keep 'em down on the farm, the farmers can all move into those nice oil-company towns, join the CIO, work 8 hours a day, and get social security and fringe benefits. With the farmers all out of the way, geophysical and drilling crews won't be bothered with fences and cows, and so they can find more oil at less cost.

Proration can be applied to algae production to keep supply balanced with demand, so we'll have no more embarrassing crop surpluses and no more arguments over 90 per cent parity (though of course the algae producers will need 27½ per cent depletion). We won't have to export wheat and stuff to get rid of it and so the foreign nations won't have to sell us oil to pay for it, thus solving the imports problem.

Oh, we could go on and on. The vista unveiled by our Great Idea is unlimited. It's revolutionary.

Of course, if you have had only casual acquaintance with pond scum you may say you'd just as soon eat the crude oil in its raw state. But never underestimate the power of our petrochemists. They have pulled so many marvels out of their magic barrel that we have no doubt that if they set their minds to it they can make algae taste like anything from a Coney Island Red Hot to a crepe suzette.

But will we run out of oil and starve to death? Not a chance. You see, oil was formed from algae in the first place. Now we will use oil to grow more algae, and the algae can be made into more oil, to grow more algae, to make more oil, to grow more—why, it's better than a cat-and-rat farm. We've even solved the problem of perpetual motion. Just leave everything to us inventors.

Too Much Territory

HERE'S one we should have put in our Texas Issue. It's about a former Texan who has recently moved to Oklahoma. But when he changed the address for our favorite oil publication, our circulation department slipped a cog and made his stencil read "Oklahoma City, Dallas, Tex." Complaining mildly, he wrote:

"While a resident of Dallas I was accustomed to Dallas regularly expanding its city limits, but if Dallas has now grown to such an extent that it not only includes Oklahoma City but all of Oklahoma, I think that we Oklahomans should have a chance to object."

We corrected the error pronto, and hereby serve notice on Dallas that the incident does not give it any pretense for attempting to extend its jurisdiction north of the Red River.

—Henry D. Ralph.

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RAM-GUNS, INC.
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BAKER BRIDGE PLUG

Oil should look its market prospect squarely in the face

HUSH—there's a surplus of oil, but if we just keep quiet maybe it'll go away.

That's been the prevailing attitude in the industry for a good many months. Nearly everyone has admitted that production, imports, and inventories have been on the high side, but those who wanted anything much done about it were considered alarmists. The popular view was that things would work themselves out pretty soon.

But things haven't worked themselves out very well, and the sluggish demand so far this spring suggests a disappointing summer. Some products markets are weak and some less accessible or less desirable crudes are almost begging for a market. A feeling is growing that all branches of the industry should give much more attention to the supply side if a balance is to be maintained. Pessimism may not be justified by the actual statistics, but the statistics are far from rosy.

WHILE SUPPLY AVAILABLE from all sources keeps increasing, total demand during the heating season from October 1953 through March 1954 increased only 0.2 per cent over the preceding winter. And during the first 4 months of 1954, demand has been only 0.6 per cent above 1952.

Such fractional gains don't jibe with the glib predictions of "annual increases of 4 or 5 per cent" which were so common last winter. The latest I.P.A.A. forecast is that during the current April-September motoring season the demand will be only 1.6 per cent above last summer, and that demand for all of 1954 will average only 2.5 per cent above 1953.

That doesn't look as though the surplus will just go away by itself any time soon. So far this year domestic production has been below 1953 and imports practically the same. But producing capacity, both foreign and domestic, is higher than ever and is increasing faster than market demand.

OH, IT IS DOUBTLESS TRUE that by 1960 or 1970 we will need all the oil we can get from any source. That probability justifies investment for future expansion. But it doesn't help any with 1954's problems.

The hard fact is that right now we have more oil at hand than consumers care to buy and there's little in the short-range outlook to suggest that demand will catch up with the amount readily available from foreign and domestic sources in the immediate future.

This means that production, imports, and refinery runs should be held closely to actual market demand rather than blithely pushed up in the fond hope that surely everything will be hunky-dory tomorrow.

The industry must prepare itself for excess world capacity and saturated markets for quite a while to come. Consumers aren't going to remove the oil surplus any time soon.

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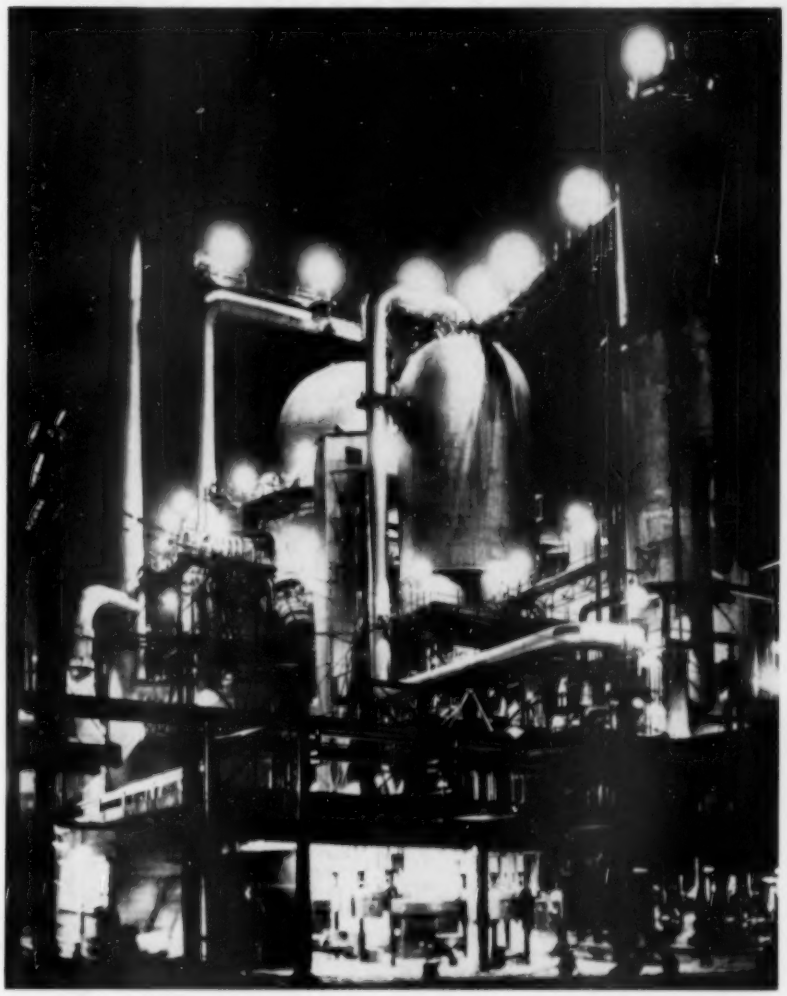
THIS WEEK . . . . . IN THE NEWS

PETROCHEMICALS—Tariff Commission report shows output of crude chemicals from petroleum and natural gas jumped 37.5 per cent in 1953. . . . Total reached 10,819,244,000 lb. . . . Increase follows 1952 slump, places production back on trend forecast by industry economists. . . . ¶Anticipated 30-cent per pound polyethylene in 1958 cited as expected adjustment in petrochem markets. . . . Wider usage, slimmer profits, and accelerated technical advances expected to characterize industry's future. . . .

TRENDS—Bureau of Mines cuts sharply its forecast of demand for 1954, says year will show smallest gain since poor year of 1949. . . . In revision of its original forecast, bureau sets total demand at 8,203,000 bbl. daily, estimates domestic production at 7,175,000 bbl. daily. . . . ¶Journal study shows that demand during first 4 months this year was only 0.6 per cent higher than the same period last year. . . . Blame placed largely on warm weather during heating season, but April was off more than expected. . . .

GOVERNMENT—Department of Justice settles one in a group of major civil suits involving fraud in postwar purchases of U. S.-owned tankers and cargo vessels. . . . Seven corporations controlled by Stavros Niarchos, Greek shipping magnate, plead guilty to fraud suits based on illegal transfer of 14 tankers and 6 Liberty ships to noncitizens. . . . Court sets fine of $110,000 on the spot, orders return of vessels and directs payment of $4 million in damages to Government. . . . ¶Thirty-four companies and groups submit 55 primary and 19 alternate offers for the 27 government-owned synthetic rubber plants. . . . Federal commission now begins negotiations aimed at sale of all 27 to industry. . . . ¶Court of Customs and Patent Appeals reverses New York Customs Court decision holding 1939 reciprocal trade agreement with Venezuela did not automatically revive when Mexican agreement was terminated in 1950. . . . High court says Venezuelan agreement became effective automatically when Mexican pact died. . . .



THIS GIANT FLUID CAT CRACKER—the world's largest—makes an impressive night scene at Gulf Oil Corp.'s Philadelphia refinery. The unit, a portion of a $50,000,000 expansion at the refinery, has a daily capacity of 63,750 bbl. The cracker was dedicated late last month along with a 125,000-bbl. crude distillation unit, which also is the world's largest. For details of the refinery's expansion, see George Weber's story on page 59.

INTERNATIONAL—Atlas Corp. and Dresser Industries get nod from Argentine Government on 25-year oil-development contract. . . . 400-mile, 16-in. pipeline among details of agreement. . . . Jersey Standard also enters scene by presenting to Peron offer to resume exploration activities. . . . ¶Pipeline completed through 47 miles of New Guinea jungle opens two shut-in fields. . . . ¶Caltex enters France as minority stockholder with government-controlled French company. . . . Exploration planned in 7,700-sq. mile Paris basin concession. . . . ¶Vacuum Oil dedicates 17,700-bbl. refinery at Coryton, England. . . . ¶Royal Dutch-Shell group increased capital expenditures 17 per cent in 1953 to $616,000,000. . . . ¶International Petroleum plans 25,000-bbl. refinery near Cartagena on the Caribbean Coast of Colombia. . . . ¶Bahrain Petroleum's report discloses Sumatra crude processed at refinery during last 2 months of 1953. . . .

PRODUCTION—World crude-oil output reaches new high of 12,352,100 bbl. daily with Middle East fields continuing to register sharp gains. . . . U. S. production during first quarter falls behind same period of 1953 and drops below average daily production for all last year. . . . ¶Texas Railroad Commission gives approval to gas and water-injection program and unitization of Nona Mills and Quien Sabe fields. . . .

Petrochem Output Up

Production increases 37.5 per cent in 1953, returning to trend of recent years; total hits over 10 billion pounds

WASHINGTON. — Production of crude chemicals from petroleum and natural gas jumped sharply in 1953, restoring petrochemical production after a slump in 1952 to a long-range growth pattern predicted by industry economists.

According to preliminary figures released by the U. S. Tariff Commission, the 1953 total was 10,819,244,000 lb., a significant record and a gain of 37.5 per cent over 1952.

While the over-all gain last year has been evident from the records of many petrochemicals, the Tariff Commission report includes many figures of interest. This year, for the first time, separate production figures are available on isobutane and nonene. The crude petrochemical record of the past 4 years, as reported by that government agency, are listed in the accompanying table.

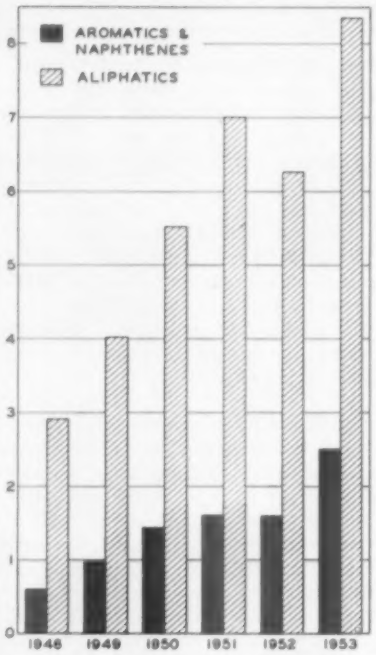
The revived production of basic aliphatics in 1953 more than offset losses registered in 1952, and raised total petrochemical output to a figure closely approximating the generalized growth curve. The dip in total production in 1952 resulted in a departure from the long-range pattern, but petrochemicals are now regarded to be back to the levels which were previously projected. Production in 1953, as shown in the chart, nearly reaches the straight-line curve established by the industry from 1946 to 1951.

As a class, the aromatics and naphthenes chalked up the greatest gains last year, showing a 53 per cent rise over 1952. This was due to the cumulative effect of many catalytic reforming units which went on stream for benzene-toluene-xylene production during 1953 and late 1952. Both petroleum benzene and toluene registered 80 per cent gains over the previous year.

Toluene, as reported by the Tariff Commission, has included some blends which were consumed in aviation gasoline, a nonchemical use in the strictest sense. Although the figure reported for 1953 does not specifically state that it includes avgas toluene, it may still represent a part of that total. Xylenes showed a spurt last year. For the past 5 years, this class of basic aromatics has continued at about 450 million pounds. The new interest in xylene-based synthetic fibers and coatings is reflected in the jump last year to nearly 750 million pounds.

In the aliphatics class, the principal basic ethylene showed a gain of 18 per cent in line with new capacity installed during the year. Propane, which took the brunt of the 1952 slump in synthetic fibers and other end uses, bounced back last year with the greatest gain of any basic chemical—110 per cent.

Isobutane, previously reported under "other C_4 hydrocarbons" is carried alone for the first time. Total 1953 production was reported at 97,625,000 lb. Another new figure, is nonene or tripropylene, which is rapidly coming into importance for detergent and other uses. Last year, 60,986,000 lb. of



Crude Petrochemicals from Oil and Gas
(Billions of pounds per year)

CRUDE PRODUCTS FROM PETROLEUM AND NATURAL GAS FOR CHEMICAL CONVERSION
(Production in thousands of pounds)

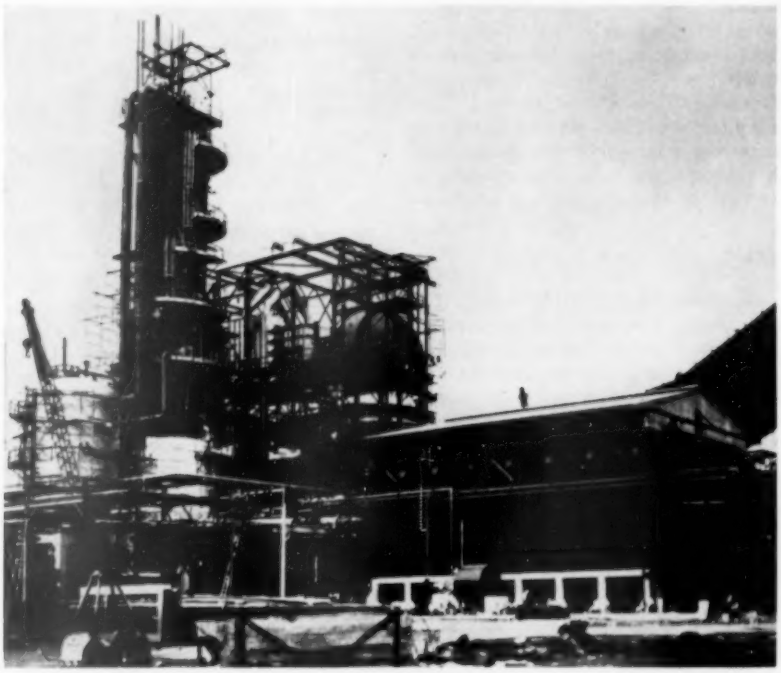
	1953	1952	1951	1950
Aromatics and naphthenes:				
Alkyl aromatics, distillates, solvents	403,168	391,263	432,139	
Benzene (except motor grade)	462,105	255,730	234,521	72,927
Cresylic acid, crude	10,780	14,317	20,386	16,080
Naphthenic acid, all grades	23,123	19,319	38,528	24,684
Toluene, all grades*	836,473	463,650	403,327	329,112
Xylenes, mixed	749,010	443,804	464,416	449,587
Other aromatics and naphthenes†	14,355	17,038	5,190	532,571
Total aromatics and naphthenes	2,499,014	1,605,121	1,598,507	1,424,961
Aliphatic hydrocarbons:				
Ethane	144,623	203,179 ‖	1,798,915	1,821,893
Ethylene	2,135,740	1,809,495 ‖		
Propane	1,216,984	580,139	973,561	998,842
Propylene and propane-propylene mixture	1,222,057	996,282	1,148,454	694,047
1,3-butadiene for rubber	1,152,197	1,106,445	1,222,411	610,056
n-Butane	388,581	37,856		
Butenes	906,732	825,171	1,136,188	641,072
Other C_4 hydrocarbons‡	632,064	404,178	460,842	387,521
C_5 hydrocarbons§	38,260	15,401		
Diisobutylene	23,157	25,325	21,670	20,044
Dodecene (propylene tetramer)	176,926	114,983	93,510	
Hydrocarbon derivatives¶	2,681	1,920	22,758	
All other aliphatic hydrocarbons‖	280,228	141,409	130,046	336,625
Total aliphatics	8,320,230	6,261,783	7,008,355	5,510,100
Grand total	10,819,244	7,866,904	8,606,862	6,935,061

*Includes toluene concentrate (aviation fuel component) on a 90 per cent basis. †Includes dicyclopentadiene, petroleum phenols, sodium carbolate and phenate, methylcyclopentane, methylcyclohexane, and petroleum polymers. For 1950 also includes aromatic distillates and solvents and motor grade benzene. ‡Includes isobutane, isobutene, n-butene, and butadiene-butene mixtures. §Includes pentanes, pentenes, isoprene, and mixtures. ¶Includes di-tert-butyl-disulfide, mercaptans, alkylsulfonic acids, reformer residues, polymers, and aliphatic acids. ‖Includes hexanes, heptanes, heptenes, octanes, octenes, nonene, polybutene, eicosane, and hydrocarbon mixtures. Also includes for 1951, C_5 hydrocarbons and for 1950, C_5 hydrocarbons, dodecene, and hydrocarbon derivatives.

this basic petrochemical were produced.

Dodecene or tetrapropylene, which is being synthesized in a number of refineries throughout the country, showed an increase of 54 per cent last year. Although the output of synthetic detergents is considered to be approaching a levelling off after having captured over half of the soap market, dodecene or tetramer, as it is known in refining circles, is still in brisk demand.

The number of crude chemicals reported by the Tariff Commission increases each year as the base of petrochemicals broadens. Last year, the new additions included acetylene and methane, both included with many others in the miscellaneous aliphatics total.



THE WORLD'S LARGEST crude distillation unit is nearing completion at Gulf Oil Corp.'s Philadelphia refinery. The unit will have a daily capacity of 125,000 bbl.

Gulf Giants Dedicated

Philadelphia refinery has world's biggest cat cracker, crude distillation unit; will become East Coast's largest

George Weber

PHILADEPHIA.—The world's largest fluid cat cracker — a 63,750-bbl. unit—has been completed and placed on stream here in the big refinery of Gulf Oil Corp.

The cat cracker was dedicated here late last month along with another unit that is the biggest of its type, a 125,000-bbl. per calendar day crude distillation unit.

Gulf's refinery here will become the largest on the East Coast when a $50,000,000 expansion program is completed later this summer. The plant will have a daily crude throughput of 183,000 bbl.

In addition to the two giant units, the plant has a new 2,800-bbl. per day catalytic polymerization plant, additional tankage bringing the total storage capacity to over 11,000,000 bbl., a new administration building, and a new home for the company's central Refinery Technology Laboratory. In addition, a 16,000-bbl. per day Platforming unit is scheduled for completion in October.

Gulf's Philadelphia expansion program, one of the largest undertaken in this country in recent years, was a factor in elevating the Greater Philadelphia area to second position in U. S. refining capacity.

S. A. Swensrud, Gulf's chairman, said the company decided to expand here due to the city's civic program of encouraging industry and the geographic location, which includes 24 per cent of the nation's motor vehicles within a 300-mile radius.

Big cat cracking outlay . . . Gulf's new fluid unit is slightly larger than a similar unit completed 2½ years ago at Port Arthur. Coupled with the existing 25,000-bbl. per day fluid unit built several years ago, it gives the Philadelphia refinery a total catalytic cracking capacity equivalent to 48 per cent on crude, compared with the national average of about 36 per cent.

Built by M. W. Kellogg Co., it is of the "side-by-side" design. Construction began in July 1952 and the unit was officially placed on stream May 27. The unit's largest vessel—the regenerator—measures 56 ft. in diameter and 84 ft. in height. The reactor has a diameter of 30 ft. 8 in. and a height of 71 ft. The 20-ft. fractionator is 125 ft. high.

Operating temperature of the unit averages 1,100° F. It circulates catalyst at the rate of 9,000,000 lb. per hour. Steam requirements run nearly 400,000 lb. per hour and 50,000 gal. of cooling water are circulated per minute.

Largest by far . . . The atmospheric and vacuum distillation unit, nearing completion by Foster Wheeler Corp., will be the largest ever constructed by a substantial margin. The record holders to date are believed to be the 100,000-bbl. units located at Abadan, Iran.

Crude will be circulated through the furnace in four parallel streams. The furnace, one of the longest ever built for refining equipment, covers 8,000 sq. ft. It will require about 2,000 bbl. of fuel oil per day. About 50 per cent of the crude charge will be topped in the atmospheric stage.

The adidtion of these new facilities will permit the conversion or retirement of existing process units. Two atmospheric and vacuum units rated at about 30,000-bbl. per day will continue in service. Of the plant's three combination crude and thermal cracking units, each rated at 11,000-bbl. per day, two will be converted to visbreaking operations to improve the refinery's yield of distillate products from residual fractions. Two small atmospheric crude stills remaining from the original battery of four built in 1927 will be retired.

Future plans . . . The company plans to add a catalytic sulfur recovery plant similar to the 60-ton per day unit operating at the Port Arthur refinery.

The plant will continue to process predominantly sour crudes. When the new crude unit is placed on stream, some South Louisiana crudes will be added to the Kuwait and Eastern Venezuelan crudes currently processed.

Pennsylvania Problem

Deep drilling can boost oil supply, but it's costly and, too, there's plenty already on hand, association told

PITTSBURGH.—Deep drilling holds promise of maintaining Pennsylvania's crude-oil supply, but the difficult geology of the area makes the prospect a costly one.

Too, the present situation of high crude stocks, daily over-production, and high inventories of finished products gives producers little incentive for large outlays to find more oil.

This is what two principal speakers told the thirty-first annual meeting of the Pennsylvania Grade Crude Oil Association here last week. Some pessimism penetrated the remarks of speakers at the annual event as a result of the recent across-the-board price cut for Penn Grade crude, but they still were optimistic over the long-range outlook for the Pennsylvania industry.

R. J. S. Pigott, Pittsburgh consultant and former director of engineering research of Gulf Research & Development Co., told the group that several horizons not now productive are believed to contain oil.

"It is fairly certain that we have not discovered much of the oil in the presently active formations, and almost nothing has been done on the deeper horizons," Pigott said.

Finding this additional oil, however, will be costly, he said, since "most of the reservoirs are lenticular, interspersed among shale blind spots." Except for Bradford field, he added, few large reservoirs occur.

Pigott told his audience that to maintain the crude supply in the area, the industry needed more scientifically guided exploration, together with a continuance and extension of secondary-recovery operations.

Research report . . . Robert B. Bossler, director of production research for the association, pointed out that possibly productive horizons such as the Medina and Trenton have been reached in only a few wells, and these were drilled around the shallower margins of the basin.

He also emphasized that oil or gas is known to occur in these older horizons on all edges of the basin except possibly in the northeast.

Bossler also outlined other research projects under study—increasing water-input rates in secondary-recovery projects, increasing the oil-production rate, and improving the drilling rate.

"While some of the aims if successful would increase the daily rate of production, which is not now recommended, we believe that the ability to do so from present wells and developed leases will be of great financial benefit under present conditions," Bossler said. If these efforts should prove successful, "leases can be operated which may otherwise have to be abandoned, with a consequent loss of underground reserves," he said.

Michigan Postings Cut

MOUNT PLEASANT, Mich.—Two purchasers of Michigan crude last week announced flat reductions of 12 cents a barrel in all crude oil postings.

First to announce the price cut was Roosevelt Oil & Refining Corp. It was followed 2 days later by Leonard Pipe Line Co.

For the past year Leonard has paid from $2.74 to $3.10 for Michigan crude, depending on the field. This new posting gives it a low price of $2.62 and a top of $2.98.

J. E. Boudler, president of the Simrall division of Roosevelt, said reduced through tariffs on out-of-state crude being shipped into Central Michigan and the price differential established by the last increase in crude prices makes a reduction in posting an "economic necessity" if Michigan crude is to "competitively maintain its markets."

Launch Second Supertanker

NEW YORK.—The second of four supertankers, the 38,000-ton SS Statue of Liberty, was launched last week by Cities Service Co. at the yards of the Newport News Shipbuilding and Drydock Co.

The new supertanker has an overall length of 707 ft., a capacity of 336,000 bbl. of crude, and a speed of 17½ knots. A sister ship, the S.S. Alton Jones, was launched in April and two more in the same class are scheduled for completion later this year.

Crude-Line Bids Asked

SHREVEPORT.—Interstate Oil Pipe Line Co. has asked for bids on its planned pipeline from Little Lake field in Jefferson Parish, to Grand Isle, La.

The line, consisting of 14 miles of 12-in. and 11 miles of 8-in., will furnish an outlet for offshore production in the Grand Isle area. Producers in the gulf will move their oil to tanks on Grand Isle where Interstate will pick it up and carry it to its system.

Big Cat Cracker Nears Completion

Workmen operating a large crane lift another section into place in their effort to complete this 40,000-bbl. catalytic cracking unit being built by Standard Oil Co. of California at its El Segundo, Calif., refinery. The company expects to have the huge unit in operation during August. Also to be completed at that time is a 52,000-bbl. residium stripper which will supply the new cat cracker with charge stock.

Price Drop Seen

Adjustments in petrochem markets expected by 1958

NEW YORK.—The advent of 30-cent per lb. polyethylene—expected by 1958—is expected to herald an adjustment period in petrochemical markets.

With production catching up with demand in many basic chemicals, the industry is probably entering a trend toward wider usage, slimmer profits, and accelerated technical advances to whittle production costs.

These views were aired here at a national meeting of the Chemical Market Research Association.

Supply, demand even . . . Dr. Robert E. Hulse, vice president of National Distillers Products Corp., said the current low price levels mark the first time that supply has caught up with demand in many chemicals, but said this is no sign of a slackening in use. Rising consumption spurred by lower prices will restore balance to the market, but he warned that the fantastic profit margins shown by some chemicals in the recent past will probably prove exceptional with increased company and product competition.

Hulse warned that companies entering the petrochemical field with small nonintegrated operations may encounter trouble in realizing adequate returns on high investments.

Plant building lags . . . The polyethylene plant building program is lagging somewhat, he said, and no substantial new production is expected to come into the picture until March or April of next year.

Price cut calendar . . . Hulse foresees a price cut from the present level of 41 cents per pound to 38 cents before much of the new capacity goes into production next year. He said the price probably will be reduced about 2 cents per year to reach the 30 cents, plus or minus 2 cents, by 1958.

New process . . . Both Hulse and John D. Fennebresque, vice president of Celanese Corp. of America, discussed the new polyethylene process recently revealed by Phillips Petroleum Co.

Fennebresque said the new low pressure process, employing catalyst and solvents, may have an important impact on the industry. In Hulse's opinion, it should not make high-pressure processes obsolete, and will not be a major factor in determining the price of the product.

Hulse said Phillips' polyethylene might prove to be a specialty material which could be blended with high-pressure polyethylene, or would find special applications which would take advantage of some of its superior properties. Quality, reproducibility, and more rigid specifications will be stressed in future polyethylene markets, he added.

Test Plugs Back

Weeks Island wildcat to test in shallower zone

NEW IBERIA, La.—Humble Oil & Refining Co. 1 Rita Provost Minvielle Estate 15 miles south of here is potentially the world's second deepest producer.

The deep test on the north flank of Weeks Island dome flowed at the rate of 347 bbl. of 45.4°-gravity condensate and 6,800,000 cu. ft. of gas per day through a ¼-in. choke during tests of a Miocene sand interval at 17,456-68 ft.

Although this production is considered commercial, the well is not being completed at this interval for the time being. Instead, it has been reperforated in a shallower oil sand at 16,834-44 ft. from which it flowed at the rate of 410 bbl. of 29.5°-gravity oil per day through a ⅛-in. choke on initial tests. Production from this shallower sand is with a gas-oil ratio of only 974 cu. ft. per barrel under 3,000 psi. pressure.

Humble's new well is a northeast offset to Shell Oil Co. 2 Gonsoulin-Minvielle, currently the world's second deepest producer with gas-condensate production from a sand interval at 17,260-17,306 ft. The world's deepest production now is in North Coles Levee field, in Kern County, California, where Richfield Oil Co. has a well with gas-condensate production from a total depth of 17,892 ft.

Including the new Humble test, four wells at Weeks Island have found production at depths below 17,000 ft.

Great Lakes Extension Begun

KANSAS CITY. — Construction started last week on a 127-mile extension of Great Lakes Pipe Line Co.'s products system from Iowa City, Ia., to Prophetstown, Ill.

The 8-in. extension will connect near Prophetstown with the Badger Pipe Line Co., line to Madison, Wis.

M-R Co., Wichita, Kans., was successful bidder on the western spread from Iowa City to the Mississippi River. Mid-States Construction Co., Mount Vernon, Ill., has the contract from the eastern bank of the river to the Badger junction.

Contract for a single-line crossing of the Mississippi between Princeton, Ia., and Cordova, Ill., is expected to be let soon.

Geologists in the service find . . .

. . . Military Has Little Use for Geology

WASHINGTON. — Geologists called for military service find relatively few assignments where they can make full use of their specialized knowledge, but seldom wind up in completely nontechnical spots, according to a survey reported to the American Geological Institute.

The canvass indicated that none of the services appear to have a regular demand for geologists, and there is no policy requiring or even recommending the use of geologists in assignments that would be handled best by individuals trained in that profession.

The Army affords the best opportunities for geologic assignments, it was reported, and has an establashed procedure for giving professional classification to qualified geologists although this is no guarantee that they will receive geologic assignments.

Within the Army, the Corps of Engineers is the main user of geologists, who find work with this segment of the military on construction problems, water supply or terrain intelligence.

The Quartermaster Corps occasionally uses geologists in uniform, some of whom have attended the Petroleum Analysis School, but QM work is not specifically geologic and is handled satisfactorily by chemists and engineers. Military Intelligence has occasional use for a geologist in a military geography team, it was reported, but such assignments are not regular, and the Transportation Corps also has used a few geologists on occasion.

The AGI was told that Navy assignments for geologists are even more difficult to pin down. The Marine Corps has provisions for a small number in various spots, but there is some question whether many of these assignments will be filled.

The Air Force is not reported to have any planned direct use for geologists, but some have been pressed into service as meteorologists, following training, and more have served in photo-interpretation units, it was stated.

Sonic Drill Nearer

Unusual tool to be tested on chert in different field

LOS ANGELES. — The sound-powered drill being developed by Borg-Warner Corp.'s Petro-Mechanics Research Division shortly will take another step toward becoming an established drilling method.

After months of testing with artificial formations in Ventura Avenue field, the drill's ability to penetrate hard, cherty formations is to be tested in East Los Angeles field. Its performance under these conditions will do much to show whether the method will become commercially available in the near future.

Testing at Ventura Avenue, for about a 15-month period, largely consisted of drilling out concrete plugs poured in a 10,000-ft. well. While the amount of footage drilled was not large, the sound-powered bit achieved high rates of penetration. In one test where igneous rock was mixed with concrete, the bit reportedly advanced at the rate of 400 ft. per hour.

This work with the "ultrasonic drill" was carried out with more or less standard equipment. Instead of hole being made through rotation, the mud stream is utilized to drive a subsurface turbine, which in turn powers a sound generator. Sonic conditions set up by the generator impart a percussion motion of less than 2 in. to the bit.

Hole-making equipment for this novel method of drilling is mounted in the drill string just above the bit. The drill pipe is rotated at slow speeds, in the range of 60 r.p.m., by means of a conventional rotary table.

It is expected that Borg-Warner may have the new drilling method mastered by the year's end. The new tools then probably will be leased to contractors and operators for use under direct supervision of the manufacturer's personnel.

New Catalyst Developed

NEWARK, N. J.—A catalyst which will remove 100 per cent of hydrogen sulfide from gas or air mixtures at room temperatures has been developed here by the Davis Emergency Equipment Co.

Developed for use in gas masks, the catalyst consists of oxides of vanadium, copper, iron and/or chromium on an activated carbon base. Its potential application to sulfur removal or sulfur recovery techniques in refining and natural gas processing is now under investigation by interested companies.

According to the developers, hydrogen sulfide up to 2 per cent by volume occurring in air or gaseous hydrocarbon mixtures is completely oxidized at room temperature on passing the catalyst. This limit is imposed by the temperatures encountered in combustion of that volume of hydrogen sulfide. The reaction produces water and elemental sulfur, which are laid down on the catalyst, gradually reducing its activity.

For use in gas masks, the catalyst's limit of activity is considered that point where hydrogen sulfide content of effluent gas reaches 5 parts per million. This point can be determined when the catalyst has increased 25 per cent in weight.

Sale Completed

Great Lakes telephone system purchased by Bell

KANSAS CITY, Mo.—Great Lakes Pipe Line Co. has sold its communications plant to Bell Telephone System companies.

The sale, recently approved by the Federal Communications Commission, provides for Bell to take over the right-of-way for 1,100 miles of pole lines and to serve the Great Lakes system with full-period telephone service for dispatching and administrative purposes and teletypewriter service between the general office and area offices.

Fifty pump stations in addition to area offices at Tulsa, Des Moines, and Sioux Falls will be interconnected with headquarters in Kansas City.

Bell plans to integrate the existing Great Lakes system with its own where possible. Other portions will be used to augment rural service and some unserviceable line will be dismantled.

Great Lakes' system runs from northeastern Oklahoma to Kansas City, where a northwest line branches off to Grand Forks, N. D. The main line continues to Des Moines before forking to Chicago and Minneapolis. Bell has always supplied the communications on the Grand Forks branch.

Products Line Let to Price

CHEYENNE.—Wyoming-Nebraska Pipeline Co. has awarded H. C. Price Co., Bartlesville, Okla., the contract on its 220-mile, 6-in. products line from here to North Platte, Neb.

The pipeline will carry a maximum of 8,000 bbl. daily from here to the Sidney, Neb., terminal and 6,000 bbl. daily from there to North Platte. Company officials expect to have the line completed by October.

Hiring Difficulties

Task of finding chemists revealed by labor survey

WASHINGTON.—Most large companies in the petroleum, chemical, and rubber industries are having difficulty recruiting chemists and chemical engineers, it was reported last week by the Department of Labor.

The situation in the three industries was revealed in a study conducted by the Bureau of Labor Statistics in cooperation with the Defense Department. The study showed that one out of 15 employes in petroleum companies, one out of 12 in chemical companies, and one out of 40 in rubber companies are engineers or scientists.

Scientific employment has risen sharply in recent years in the oil and chemical industries, but considerably less in rubber, the report said. Between 1948 and 1953, the oil companies covered by the study increased their employment of chemists by 26 per cent, chemical engineers by 40 per cent and other scientists and engineers by 44 per cent. For chemical companies the corresponding increases were 28, 45 and 62 per cent, and for rubber 6, 26 and 46 per cent.

Increases in employment of chemists and chemical engineers probably would have exceeded those actually achieved in recent years if the supply of personnel had been more adequate, the report said. In over half of the reporting companies, going or proposed activities were hampered or curtailed by manpower shortages in the chemical professions, the report said. Research and development was the major activity affected by these shortages. Some companies had to give production departments priority in recruitment and sometimes had to shift personnel from research to production work at the expense of the former.

The need for chemists and chemical engineers to fill vacancies last year was estimated at about 5 per cent of the companies' January 1953 employment in those professions. This gross replacement need accounted for more than half of the total hirings anticipated by petroleum companies.

The 1953 graduating class was expected to supply over 70 per cent of the chemists and nearly 80 per cent of the chemical engineers hired by the reporting companies last year. The planned employment of chemistry graduates was about the same as actually hired in 1952, but in chemical engineering the indicated need was nearly one-third greater than a year earlier.

Fraud Proves Costly

Seven Niarchos corporations plead guilty to tanker fraud, pay U. S. $4 million damages and $110,000 in civil fines

WASHINGTON. — The Department of Justice has settled one of the major groups of civil cases involving the illegal transfer of American flag tankers and cargo vessels to noncitizen control.

Settlement proved expensive to the Stavros Niarchos interests who financed the American corporations which actually took title to 14 tankers and 6 Liberty cargo ships purchased from the old Maritime Commission after the war.

The settlement involves the return to the Government of nine tankers and five cargo vessels (a sixth Liberty was sold in foreclosure proceedings) on which the Government has collected approximately $12,000,000 on the original purchase price of over $19,000,000. The obligation to pay the unpaid balance of about $7,700,000 will be canceled.

Five other tankers now in foreign waters will be surrendered to the Government as soon as current charters have been performed but not later than December. The Niarchos interests will discharge all mortgage liens now against the vessels, amounting to approximately $5,900,000.

Costly for Niarchos . . . The Niarchos interests will pay the Government $4,000,000 for the Government's loss while the ships were illegally in their possession. This will be paid in installments of $1,000,000 immediately and three annual payments of $1,000,000 secured by guarantees of a responsible American bank.

The settlement will not affect pending tax claims now under investigation by the Internal Revenue Service, the extent and amounts of which have not yet been determined.

The department agreed that actual forfeiture of the vessels will be deferred for 90 days, to permit negotiations aimed at construction of new tonnage in exchange for approval of transfer of the 14 vessels to friendly foreign flag operations, in lieu of forfeiture.

Settlement followed the entry of a plea of guilty by seven corporations controlled by Niarchos and imposition of fines totaling $110,000, which were paid immediately in cash. The companies involved were the Compania Internacional de Vapores, Ltds.; Plymouth Tanker Corp.; North American Shipping & Trading Co.; American Pacific Steamship Co.; Delaware Tanker Corp.; Oriental Tanker Corp., and the American Overseas Tanker Corp.

Criminal actions pending . . . Settlement of the civil proceedings, the department said, do not dispose of criminal proceedings pending against nine corporations and various officers and employes which the Government regards as under the control of Niarchos and his associates. These include those against former Rep. Joseph E. Casey of Massachusetts, former Minister to London Julius C. Holmes and four others involved in surplus ship purchases after the war.

Officials also said the settlement will have no effect on forfeiture proceedings pending on 24 other vessels.

Involved in the settlement were six tankers and three Liberties seized from the North American Shipping & Trading Co.; two tankers and three Liberties held by the American Pacific Steamship Co., and a tanker held by the Ventura Steamship Co. The five tankers yet to be seized are held by the American Overseas Tanker Corp.

The indictments in the case were handed down by a grand jury in April 1953 but were kept sealed until last February. The defendants were charged with conspiring to defraud the United States and to violate the false statements statute by falsely describing the shipping companies as controlled by United States citizens and by filing false financial statements, balance sheets and other documents. One count involved breaking a purchase contract for five tankers by changing the American citizen ownership by means of sale of all capital stock of American Overseas Tanker without Maritime approval.

All of the cases stemmed from investigations by congressional committees into the sales of surplus vessels by the Maritime Commission.

Plant Bids Submitted

Government commission can now start negotiations for sale of U. S.-owned synthetic rubber plants on basis of offers

WASHINGTON.—Keen competition for the 27 government-owned synthetic rubber plants was evidenced last month by the 55 primary proposals and 19 alternate offers submitted by 34 companies and groups.

Although slightly short of the 60 bids the Rubber Producing Facilities Disposal Commission had anticipated, officials expressed themselves well satisfied with the interest shown. The number of offers opened on the May 27 deadline was expected to be swelled by additional bids still in the mails.

The names of the bidders were made public by the commission, but neither the facilities bid upon nor the price offered was revealed. The lattter was shown in a second copy of the bid, forwarded separately to guard against any disclosure before the time the commission considers it desirable to further negotiations.

Bidders ranged from shoe companies to drug manufacturers, but included 11 oil companies and Edwin W. Pauley, who has broad oil interests. Sixteen of the 19 present operators of the government plants submitted bids, presumably upon the facilities they now have.

Negotiations start now . . . With the basic bids in, the commission now will engage in negotiations for actual agreements. The negotiations must take into consideration prices, competitive aspects with particular regard to small business enterprises, national security, technical competence and financial responsibility.

The law provides that the commission must come up next January with a program for the sale of facilities capable of producing annually at least 500,000 long tons of general purpose and 43,000 long tons of butyl rubber. Officials expressed confidence this can be done since the total rated annual capacity of the 13 general purpose rubber plants offered is 860,000 long tons and that of the two butyl rubber plants

90,000 long tons. The two alcohol butadiene facilities, both now in standby, may be either leased or sold. Other facilities must be sold or put in standby condition.

While 16 of the 19 present operators submitted bids, no offers were received from the Neches Butane Products Co., operator of a butadiene plant at Port Neches, Tex.; Carbide & Carbon Chemicals Co., operator of the standby alcohol butadiene plant at Louisville, Ky., or the Kentucky Synthetic Rubber Corp., operator of a GR-S plant at Louisville, Ky., as a single entity.

The bidders . . . Bidders were as follows:

Esso Standard Oil Co., Goodrich-Gulf Chemicals, Inc., including the B. F. Goodrich Co. and Gulf Oil Corp.; Humble Oil & Refining Co., Edwin W. Pauley, Petroleum Chemicals, Inc., including Cities Service Co. and Continental Oil Co.; Phillips Chemical Co. including Phillips Petroleum Co.; Shell Chemical Corp., including Shell Oil Co.; Sinclair Refining Co., Standard Oil Co. (Calif.), and The Texas Co.

American Chemical Corp., which includes the Richfield Oil Corp. and the Stauffer Chemical Co.

American Synthetic Rubber Corp., which includes the American Biltrite Rubber Co., American Cyanamid Co., Anaconda Wire & Cable Co., Brown Rubber Co., Inc., Dewey & Almy Chemical Co., Dunlop Tire & Rubber Co., Endicott-Johnson Corp., Faultless Rubber Co., Hewitt-Robins, Inc., General Cable Co., Goodall Rubber Co., Johnson Rubber Co., KYS Corp. (consisting of Bata Shoe Co., Inc., Bristol Manufacturing Co., Converse Rubber Co., Goodyear Footwear Corp., Goodyear Rubber Co., LaCrosse Rubber Mills Co., Servus Rubber Co., Tingley Reliance Rubber Co., and Tyer Rubber Co.), Phelps Dodge Copper Products Corp., Raybestos-Manhattan, Inc., Rome Cable Co., Seamless Rubber Co., Simplex Wire & Cable Co., Sponge Rubber Products Co., Thermoid Co. and Wooster Rubber Co.

Copolymer Corp., which includes the Armstrong Rubber Co., Armstrong Rubber Manufacturing Co., Dayton Rubber Co., Gates Rubber Co., Mansfield Tire & Rubber Corp., Sears, Roebuck & Co., and Seiberling Rubber Co.

Climax Molybdenum Co., Dow Chemical Co., Firestone Tire & Rubber Co., Food Machinery & Chemical Corp., Foster Grant Co., Inc., General Chemical Division, Allied Chemical & Dye Corp.; General Tire & Rubber Co., Goodyear Synthetic Rubber Corp., including the Goodyear Tire & Rubber

WATCHING WASHINGTON

Bertram F. Linz

Delicate Stage Reached

The Rubber Producing Facilities Disposal Commission is now entering upon the most delicate part of the effort to sell the government's synthetic rubber plants—agreement as to price and other conditions with the companies that by formal bid evidenced interest in acquiring them.

The bids themselves were only the basis for negotiations and not final offers. The disposal act requires that the commission use the highest amount offered for each facility as the basis for negotiating its sale. While it will negotiate first with the interest offering the highest amount, it will also talk to the other bidders to see if they are willing to top that offer.

The negotiations are the delicate part of the operation because not later than next January 31 the commission must make a full report to Congress and present a program for the sale of plants capable of producing 500,000 long tons of general-purpose and 43,000 tons of butyl rubber annually. Either House can wash out all the work of the commission by disapproving a single sale.

The law gives Congress 60 meeting days in which to act on the sales plan. If either House turns down the sale of a single plant and as a result the remaining facilities will not be capable of producing the 543,000 tons a year the whole program will be scrapped and the plants retained in government ownership.

Since the sales program not only has to return the government a good price for the plants but also has to satisfy the Attorney General that it will not tend to create or maintain a situation inconsistent with the antitrust laws, the commission will have to walk carefully over the next 7 or 8 months.

We've Built Competition

Forty-five billion dollars contributed by the United States to the recovery of Europe since the last World War has built up her basic industries to the point where they have become formidable competitors of our own industries.

That in itself might not be a material disadvantage, according to Sens. Styles Bridges of New Hampshire and Stuart Symington of Missouri. Both went to Europe last winter for a quick but thorough look at the industrial and military situation.

Many foreign companies, they found, receive further aid from their own government in tax benefits, subsidies and support of cartels. On top of this, they pointed out, the United States is urged to lower our own tariff barriers so as to make it easier for them to enter our markets in increased volume.

European countries employ various devices, such as exchange controls, to limit their imports of American products and often use our aid dollars as the means for support of soft-currency deals with other foreign countries.

Since Bridges is chairman of the Senate appropriations committee and ranking Republican on the armed forces committee of which Symington also is a member, their views are likely to carry considerable weight when the foreign aid program comes up for consideration.

Tariff Battle Sidestepped

President Eisenhower's abandonment of his demand for a 3-year continuance of the Reciprocal Trade Act and further reductions in rates has postponed the showdown on tariffs until next year.

Recognizing the impossibility of jamming such a program through Congress, the President recently made it known he would settle for a 1-year extension of the act as is.

As a matter of fact, New York Rep. Daniel Reed has been stalling on consideration of the reciprocal trade program by his ways and means committee until there just isn't time enough to pass a controversial bill this session. Now he is expected to hold hearings sometime this month and start an extension bill on its way.

The Randall Commission and the State Department exerted strong pressure on the President to fight for his program, but it finally became apparent that if he did so Congress might take no action whatever, the law might be permitted to die June 12. Once dead it could not be revived.

Co.; W. R. Grace & Co., Hercules Powder Co., Inc.; Heyden Chemical Corp., Koppers Co., Inc.; Merck & Co., Inc., Midland Rubber Corp., Minnesota Mining & Manufacturing Co., Monsanto Chemical Co., J. G. Mulligan & Co., National Lead Co., Publicker Industries, Inc., United States Rubber Co. and Great Southern Chemical Corp.

Import Tax Upheld

100 per cent import levy hike was legal, court says

WASHINGTON.—The 1939 Venezuelan reciprocal trade agreement was legally revived when the agreement with Mexico was cancelled in 1950—in spite of the fact it increased import taxes on oil by 100 per cent under some conditions.

The U.S. Court of Customs and Patent Appeals held that the Venezuelan agreement was restored automatically. The New York Customs Court had previously said some affirmative action by the President was necessary.

The original Venezuela agreement carried a 50 per cent reduction in the 21-cents per barrel tax on a quota basis. The later Mexican agreement extended the reduction to a flat 10½ cents on all imports in 1943 without any quota arrangement. A presidential proclamation revoked the Mexico agreement in 1950 and the resulting revival of the Venezuelan agreement restored import taxes to 10½ cents subject to quota conditions.

Importer sues . . . Metropolitan Petroleum Corp. was taxed on the 21-cent rate on fuel oil imported from Curacao and sued to have the action held illegal. The company claimed the tax was a violation of Reciprocal Trade Act provisions which limit rate changes by the President to 50 per cent.

On a 3-to-1 decision, the high customs court held that Congress was aware of the existence of the suspended Venezuelan pact when it imposed the presidential limitation in 1945.

"We respect, recognize, and sustain the Venezuelan agreement as being fully effective on the termination of the Mexican agreement, regardless of anything that might be inferred to the contrary from what was set forth by the executive in the terminating proclamation," Judge William P. Cole, Jr., said in the majority opinion.

Judge Eugene Worley dissented and expressed "complete accord" with the New York court decision that the increase was void. The only appeal is to the U.S. Supreme Court.

Depletion Foes Get Set Back

WASHINGTON.—Advocates of a cut or elimination of the depletion allowance for oil and gas received a setback when the Senate finance committee increased the allowance for 28 minerals to 23 per cent.

The committee's action followed its rejection of a proposal by Sen. John J. Williams of Delaware to cut the allowance for oil and gas from 27½ to 15 per cent. It wrote into law, for the first time, the option to expense or capitalize intangible drilling expenses now covered only by Internal Revenue Service regulations.

The report on the tax-revision bill has not yet been written, but the committee explained the increases in depletion rates were based on the need for encouraging the domestic production of strategic and critical minerals as a defense measure.

The legislation already has been passed by the House, and the committee changes are in the form of amendments to which the House will be asked to agree. The committee now is winding up its work on the measure and expects to have its bill and report ready for Senate consideration about the middle of the month.

Asphalt Use Urged

WASHINGTON.—A House armed services subcommittee recommended last week that the Air Force use asphalt instead of concrete for air base paving wherever possible.

The subcommittee criticized the practice of the Air Force for allowing a 5 per cent "premium" to contractors using concrete, and said the use of asphalt in noncritical areas would save at least $50,000,000 in the service's proposed construction program.

The subcommittee said there are large areas on a field which are used only a small part of the time by airplanes taking off and landing, and said premium pavement is not required for that purpose.

In critical areas, the subcommittee agreed that the continuance of the use of concrete is justified, but in noncritical areas it said the difference between concrete and asphalt should be weighed without a price differential and by direct comparison of first costs.

Court Passes Scrip Question

WASHINGTON.—The Supreme Court refused last week to determine whether scrip issued by the Government during the middle years of the nineteenth century is still valid for the acquisition of government lands.

Its dismissal of the issue without comment affirms an Appellate Court decision that the Interior Department has the authority to deny scrip claims, which it had done in the case of a claim by the West Coast exploration company to sodium lands in California.

The court's action finally settles an issue first raised in 1946 when scrip claims were asserted to submerged oil lands off the California coast and later were extended to the Louisiana and Texas tidelands.

Eleven scrip applications were denied by former Interior Secretary Oscar L. Chapman in November 1951 on his solicitor's opinion that the tidelands did not fit under any of the laws which authorized the issuance of scrip to encourage homesteading on the public lands. The scrip originally was issued to veterans.

MID-CONTINENT

Nebraska Activity Increases

LINCOLN, Neb.—The 55 notices of intention to drill processed by the Nebraska Conservation Survey Division during April is an all-time high for Nebraska.

The survey division said the average number of notices processed monthly is from 25 to 30. The April mark is expected to stand for some time. May filings have gotten a slow start.

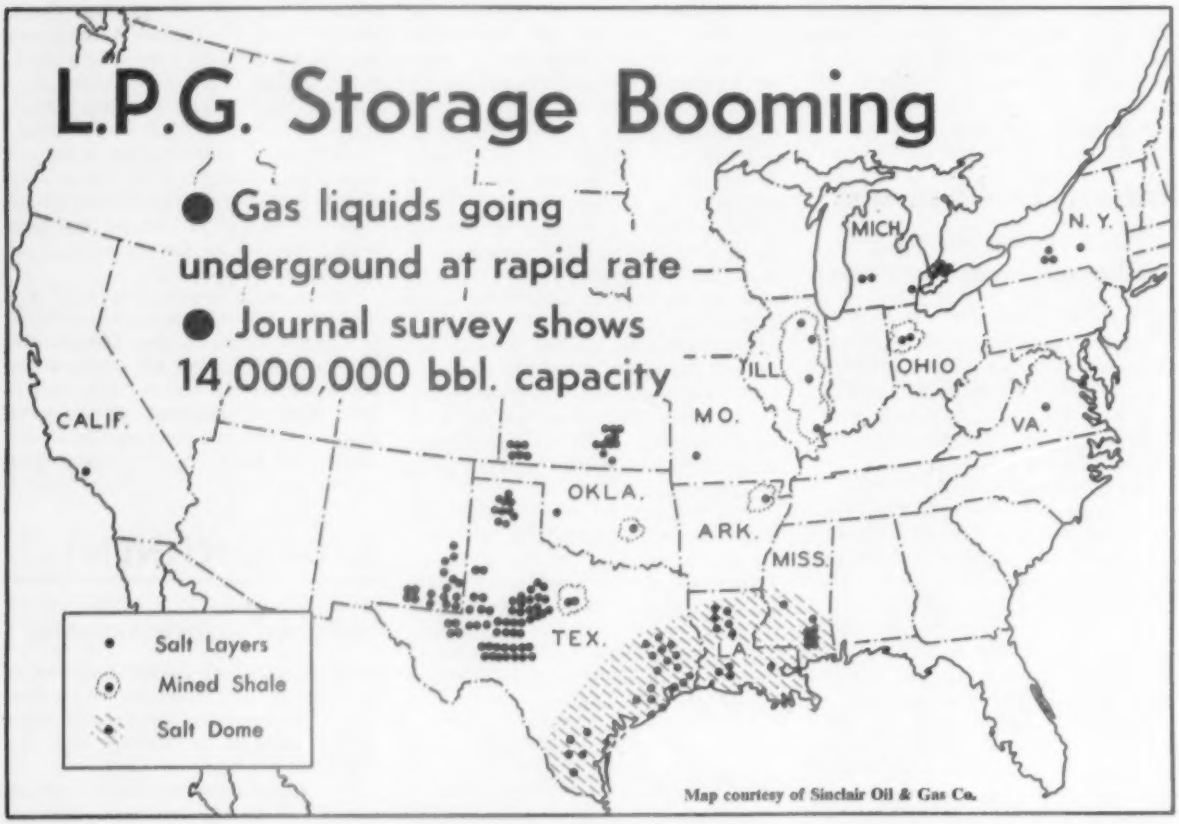
The new high in projected drilling is due to new activity in Banner County, Long field, Kimball County and through the area southwest of Sidney in Cheyenne County. Drilling in this Denver-Julesburg basin area has been on the increase since increased pipeline facilities were provided about 2 years ago.

Tulsa Firm Buys Pipeline

TULSA.—Big Heart Pipe Line Co. has purchased approximately 175 miles of crude gathering lines in the Collinsville-Hominy-Skiatook area of northeastern Oklahoma from Service Pipe Line Co.

No price was disclosed in the transaction which involves lines servicing 1,100 producing wells in the area. Henry Zarrow, president of the Big Heart Pipe Line Co., said that his firm was selling crude to Service.

In June 1953, Big Heart purchased the old Bareco system in northeastern Oklahoma and is now selling the crude it moves through it to Continental Oil Co.



Paul Swain

THERE are now in the United States more than 100 underground storage facilities with a total capacity exceeding 9,000,000 bbl. of liquefied petroleum gas.

Another 65 projects, now in the planning or construction stage, will boost this capacity to more than 14,000,000 bbl.

These figures are almost incredible when, it is pointed out, the first underground facility for L.P.G. storage was washed out of a salt cavity near Kermit, Tex., less than 4 years ago. They sound more credible in the face of industry estimates that 131,000,000 bbl. of L.P.G. will be used this year—nearly double 1949 sales and five times as much as was sold in 1945.

That first inexpensive cavity in Texas, plus a rapidly expanding business, has sparked a boom in the construction of underground storage.

The Liquefied Petroleum Gas Association recently disclosed that conversion of farm tractors to L.P.G. is continuing and is expected to accelerate in the future. The association estimated that there were 160,000 L.P.G. farm tractors in operation at the end of 1953—a gain of 23 per cent last year. At the same time the number of L.P.G. buses, trucks and stationary engines increased even more.

As fast as the L.P.G. industry is growing—it has been mentioned in the same breath as television in respect to rapid growth—it still has not been able to solve the problem of seasonal demand for its product. Additional and less seasonable markets may help alleviate this but for the present L.P.G., like other heating fuels, watches demand sink rapidly during the summer and soar in cold weather.

If the industry is not to be faced with periodic shutdowns of gasoline plants, it must dump its production on a depressed market about 6 months of the year or resort to wasteful flaring. Adequate storage to level those peaks and dips in demand is the obvious answer and it has been a major industry problem.

The industry is almost universally embracing underground storage as the answer. This is not surprising. Cost estimates on underground storage range from 50 cents to $2 a barrel compared to about $19 a barrel for steel storage aboveground.

The Bureau of Mines reported as of February 28—a slack storage period—there was 3,868,100 bbl. of L.P.G. in storage at plants, terminals and underground in the United States. Of that total 1,787,500 bbl. or more than half, was underground.

Where it is . . . From a healthy economic standpoint, more storage facilities are needed in market areas to improve the balance between production and transportation and to assure reliable L.P.G. supplies for major markets.

The lion's share of underground storage, however, is still in areas of production. But, more facilities are in use in market areas today than a year ago. At present some 88 per cent of the total storage in use is in Texas, Kansas, Louisiana, Mississippi, and New Mexico. Texas alone accounts for almost 6,000,000 of it. A year ago the five states had 96 per cent of the storage and it totalled just about as much as Texas now has alone.

What kind it is . . . Storage in use today can be roughly divided into five types—salt layers, salt domes, shale or

other hard rock formations abandoned as fields and some abandoned caverns once used for other purposes.

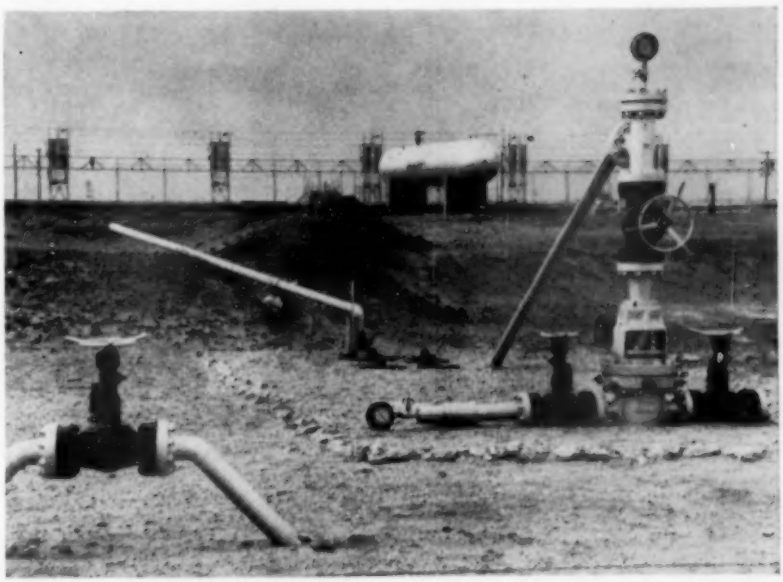
... **Salt layers** underlying several areas of the United States are probably the most widely used of the five. The saline sections are found in the Permian basin, including parts of Texas, New Mexico, Oklahoma and Kansas; the Michigan basin, which covers parts of Michigan, Ohio, Pennsylvania, New York and West Virginia; and the Great Lakes area.

... **Salt domes,** intrusive deposits of almost pure salt, are found all along the Gulf Coast. They exist inland from about 80 miles at Corpus Christi to more than 200 miles above Port Arthur and reaching north of Tyler and Longview in Texas and in most of Louisiana and a portion of Mississippi.

... **Mined shale** caverns are in use in several areas of the country but at the present such facilities contain a little less than 700,000 bbl. of L.P.G. or slightly less than 8 per cent of the nation's total underground storage. Additional facilities of the same type will boost this capacity to about 1,000,000 bbl. or less than 7 per cent of storage already in the planning stage.

... **Abandoned or partially depleted** gas reservoirs account for some of the larger underground facilities now being used. Two such facilities in Waller County, Texas, operated by Humble have a combined capacity of 1,375,000 bbl.

... **Abandoned mines or tunnels** are used and can be used in some cases for storage of L.P.G. An example is an abandoned railroad tunnel in Virginia now being used by the Bottled Gas Corp. of Virginia to store 115,000 bbl.



TYPICAL L.P.G. STORAGE well is this one 15 miles west of Midland, Tex. The above-ground pressure storage and railroad loading racks may be seen in the background.

How they work . . . Preparation of an underground facility in a salt layer or dome sounds deceptively simple. A well is drilled into the salt deposit and fresh water is circulated in the hole dissolving the salt and creating the cavity.

L.P.G. is pumped into this cavity during slack-demand periods and displaced by water when it can be more easily marketed. Each time this operation takes place the storage cavity gets larger as the water dissolves more of the salt formation each time.

Thus, the initial cost of creating underground storage in salt cavities decreases on a per barrel basis the longer it is used. Operation of a salt cavity storage facility, in itself, increases the capacity. One company boosts the capacity of three large facilities of this type at the rate of 600 bbl. daily while it is in use. This company does not attempt to determine any ultimate capacity for its facilities.

"We just plan to keep on using them, enlarging them, until we run into trouble," an official of the firm said.

The following table was prepared from basic information furnished by Sinclair Oil & Gas Co., expanded and supplemented by a Journal survey of producers and marketers of liquefied petroleum gases.

L.P.G. Underground Storage Projects by States

Company—	County	Type of storage	Capacity in barrels—Present	Capacity in barrels—Ultimate	Product
ARKANSAS					
Warren Petroleum Corp.	Independence	Mined shale	.....	100,000	Propane
CALIFORNIA					
Standard Oil Co. of California	Los Angeles	Water sand	44,000	100,000	Propane
ILLINOIS					
National Petro-Chemicals Corp.	Douglas	Mined shale	150,000	150,000	Propane
Phillips Petroleum Co.	Kankakee	Mined shale	260,000	300,000	Propane
Warren Petroleum Corp.	Kane	Mined shale	50,000	50,000	Propane
	White	Mined shale	50,000	50,000	Propane
KANSAS					
Cities Service Oil Co.	Reno	Salt layer	.....	25,000	Propane
	Reno	Salt layer	.....	25,000	Propane
	Reno	Salt layer	.....	25,000	Propane
	Reno	Salt layer	.....	25,000	Butane
Driller Gas Co.	Reno	.....	1,500	1,500	Propane
National Co-Op Refinery Association	McPherson	Salt layer	25,000	50,000	Propane
	McPherson	Salt layer	.....	50,000	Propane
Phillips Petroleum Co.	Kingman	Salt layer	.....	50,000	Propane
	Kingman	Salt layer	.....	50,000	Propane
Skelly Oil Co.	McPherson	Salt layer	22,000	50,000	
	McPherson	Salt layer	29,000	50,000	
	McPherson	Salt layer	29,000	50,000	
	McPherson	Salt layer	25,000	50,000	

Company—	County	Type of storage	Capacity in barrels— Present	Ultimate	Product
KANSAS (Continued)					
	McPherson	Salt layer	25,000	50,000	
	McPherson	Salt layer	16,000	30,000	
Stanolind Oil & Gas Co.	Grant	Salt layer	25,000	25,000	Butane
	Grant	Salt layer	25,000	25,000	Propane
	Grant	Salt layer	25,000	25,000	Propane
	Grant	Salt layer	25,000	25,000	Butane
	Grant	Salt layer	25,000	25,000	Butane
	Grant	Salt layer	25,000	25,000	Propane
LOUISIANA					
Esso Standard	Ascension	Salt dome	.....	100,000	Propane
General Gas Corp.	Bienville	Salt dome	100,000	200,000	B-P mix
	Bienville	Salt dome	100,000	200,000	Propane
	Bienville	Salt dome	.....	100,000	Butane
	Bienville	Salt dome	.....	100,000	B-P mix
Petroleum Sales, Inc.	Evangeline	Salt dome	100,000	100,000	B-P mix
	Evangeline	Salt dome	50,000	100,000	B-P mix
	Evangeline	Salt dome	.....	100,000	Butane
Warren Petroleum Corp.	Bienville	Salt dome	100,000	120,000	B-P mix
	Bienville	Salt dome	70,000	70,000	B-P mix
MICHIGAN					
Cities Service Oil Co.	Kent	Salt layer	100,000	100,000	Propane
Skelly Oil Co.	Kent	Salt layer	50,000	100,000	Propane
Sun Oil Co.	Wayne	Salt layer	.....	50,000	Propane
MISSISSIPPI					
Anchor Petroleum Co.	Forrest	Salt dome	100,000	100,000	Propane
	Forrest	Salt dome	50,000	50,000	B-P mix
	Forrest	Salt dome	100,000	100,000	Propane
	Forrest	Salt dome	100,000	100,000	
General Gas Corp.	Hinds	Salt dome	.....	100,000	B-P mix
Skelly Oil Co.	Forrest	Salt dome	23,000	50,000	
	Forrest	Salt dome	30,000	60,000	
Warren Petroleum Corp.	Forrest	Salt dome	100,000	100,000	B-P mix
	Forrest	Salt dome	100,000	150,000	B-P mix
	Forrest	Salt dome	100,000	150,000	Propane
MISSOURI					
Missouri Hydro Gas Co.	Greene	Mined ls.	25,000	25,000	B-P mix
NEW YORK					
Anchor Petroleum Co.	Steuben	Salt layer	100,000	100,000	Propane
Suburban Propane Co.	Courtland	Salt layer	.....	25,000	Propane
NEW MEXICO					
Atlantic Refining Co.	Lea	Salt layer	.....	50,000	Propane
El Paso Natural Gas Co.	Lea	Salt layer	50,000	50,000	Propane
	Lea	Salt layer	.....	50,000	Propane
Gulf Oil Corp.	Lea	Salt layer	43,000	50,000	Propane
Pure Oil Co.	Lea	Salt layer	75,000	80,000	Propane
Sacra Bros.	Eddy	Salt layer	12,000	36,000	Propane
	Eddy	Salt layer	.....	36,000	Propane
	Eddy	Salt layer	.....	36,000	Butane
Skelly Oil Co.	Lea	Salt layer	70,000	70,000	Propane
	Lea	Salt layer	51,000	70,000	Butane
	Lea	Salt layer	16,000	30,000	
Warren Petroleum Corp.	Lea	Salt layer	50,000	50,000	B-P mix
	Lea	Salt layer	.....	50,000	Propane
OHIO					
Standard Oil Co. (Ohio)	Allen	Hard rock	.....	30,000	Propane
	Allen	Hard rock	.....	30,000	Propane
OKLAHOMA					
Shell Oil Co.	Beckham	Salt layer	.....	15,000	Propane
Sinclair Oil & Gas Co.	Seminole	Mined shale	.....	110,000	Propane
TEXAS					
Anchor Gasoline Corp.	Midland	Salt dome	47,500	.....	Propane
	Midland	Salt dome	47,500	.....	Propane
	Midland	Salt dome	47,500	.....	Butane
Anchor Petroleum Co.	Hardin	Salt dome	.....	50,000	Butane
	Hardin	Salt dome	.....	50,000	Isobutane
	Martin	Salt layer	55,000	.....	Propane
	Martin	Salt layer	55,000	.....	Propane
	Martin	Salt layer	55,000	.....	Butane
	Martin	Salt layer	55,000	.....	Butane
Barnhardt Hydrocarbon Corp.	Reagan	Salt layer	.....	50,000	Propane
	Reagan	Salt layer	.....	100,000	Butane
Chicago Corp.	Panola	Salt water sd.	150,000	150,000	Propane
Cities Service Oil Co.	Gray	Salt layer	25,000	100,000	Propane
Continental Oil Co.	Reagan	Salt layer	.....	50,000	L.P.G.
Dow Chemical Co.	Brazoria	Salt dome	.....	100,000	L.P.G.
	Brazoria	Salt dome	.....	200,000	L.P.G.

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TEXAS (Continued)

Company—	County	Type of storage	Capacity in barrels— Present	Ultimate	Product
Ellis Transport Corp.	Harris	Salt wells	400,000	400,000	L.P.G.
Enterprise Petroleum Gas Co.	Wood	Salt dome	25,000	25,000	B-P mix
	Wood	Salt dome	.....	50,000	Propane
Freestone Underground Storage Corp.	Freestone	Salt dome	35,000	50,000	Propane
Gulf Oil Corp.	Crane	Salt layer	25,000	50,000	Propane
	Crane	Salt layer	.....	30,000	
	Jefferson	Salt dome	.....	100,000	Mixture
Humble Oil (as operator)	Waller	Gas sand	500,000	Undeterm.	Butane
	Waller	Gas sand	975,000	Undeterm.	Propane-ethane mix
La Gloria Corp.	Jim Wells	Sand form.	72,000	72,000	Butane
	Jim Wells	Sand form.	25,000	72,000	Propane
Lion Oil Co.	Scurry	Salt layer	50,000	50,000	Propane
	Scurry	Salt layer	25,000	50,000	Propane
Magnolia Petroleum Co.	Jim Wells	Sand form.	54,000	75,000	Propane
	Liberty	Salt layer	.....	100,000	L.P.G.
Panoma Corp.	Carson	Salt layer	.....	25,000	Propane
	Carson	Salt layer	.....	25,000	Butane
Phillips Petroleum Co.	Hutchinson	Salt layer	125,600	Undeterm.	Propane
	Hutchinson	Salt layer	85,300	Undeterm.	Propane
	Hutchinson	Salt layer	83,700	Undeterm.	Propane
	Hutchinson	Salt layer	43,000	Undeterm.	Propane
	Ector	Salt layer	80,000	100,000	Propane
	Ector	Salt layer	.....	100,000	Propane
	Midland	Salt layer	.....	100,000	Butane
	Upton	Salt layer	.....	100,000	Butane
	Upton	Salt layer	.....	100,000	Butane
	Upton	Salt layer	.....	100,000	Propane
	Upton	Salt layer	.....	100,000	Propane
Pure Oil Co.	Andrews	Salt layer	.....	75,000	B-P mix
	Andrews	Salt layer	.....	75,000	B-P mix
Reef Field Gasoline Corp.	Howard	Salt layer	.....	75,000	B-P mix
	Howard	Salt layer	.....	75,000	B-P mix
	Howard	Salt layer	.....	75,000	Butane
Richardson & Bass	Winkler	Salt layer	.....	200,000	B-P mix
Richardson Gasoline Co.	Winkler	Salt layer	107,000	107,000	Propane
	Winkler	Salt layer	56,000	110,000	B-P mix
	Winkler	Salt layer	32,000	100,000	Propane
Shamrock Oil & Gas Corp.	Hutchinson	Salt layer	.....	30,000	Propane
Shell Oil Co.	Yoakum	Salt layer	90,000	90,000	Propane
		Salt layer	90,000	90,000	
Skelly Oil Co.	Carson	Salt layer	77,000	.....	Propane
	Carson	Salt layer	59,000	.....	Butane
	Carson	Salt layer	68,000	.....	Propane
	Carson	Salt layer	27,000	.....	
Southern Minerals Corp.	Nueces	Oil sand	83,000	125,000	Propane
Standard of Texas	Scurry	Salt layer	.....	25,000	B-P mix
	Scurry	Salt layer	.....	25,000	B-P mix
Stanolind Oil & Gas Co.	Andrews	Salt layer	25,000	50,000	
	Andrews	Salt layer	50,000	*50,000	Butane
	Andrews	Salt layer	50,000	*50,000	Propane
	Ector	Salt layer	100,000	*150,000	Propane
	Hockley	Salt layer	25,000	*50,000	Propane
Sun Oil Co.	Jefferson	Salt dome	.....	100,000	Butane
	Starr	Oil sand	.....	.....	Propane
Sunray Oil Corp.	Scurry	Salt layer	140,000	150,000	Propane
	Scurry	Salt layer	140,000	150,000	Propane
	Scurry	Salt layer	140,000	150,000	Butane
The Texas Co.	Hardin	Salt layer	100,000	100,000	Butane
	Hardin	Salt layer	100,000	100,000	Propane
	Hardin	Salt layer	100,000	100,000	Propane
	Scurry	Salt layer	.....	100,000	
Texas Gas Products	Upton	Salt layer	.....	100,000	
	Glasscock	Salt layer	.....	100,000	
	Chambers	Salt layer	.....	300,000	
Texas Natural Gasoline Co.	Upton	Salt layer	120,000	120,000	Propane
	Upton	Salt layer	120,000	120,000	Butane
	Upton	Salt layer	85,000	120,000	Isobutane
	Upton	Salt layer	.....	120,000	Butane
	Upton	Salt layer	.....	120,000	Propane
Warren Petroleum Corp.	Stephens	Mined shale	25,000	25,000	B-P mix
	Stephens	Mined shale	37,500	37,500	B-P mix
	Smith	Salt dome	100,000	150,000	B-P mix
	Smith	Salt dome	100,000	100,000	Propane
	Smith	Salt dome	100,000	200,000	B-P mix
	VIRGINIA				
Bottled Gas Corp. of Virginia	Nelson	Abd. R.R. tunnel	115,000	115,000	
TOTAL STORAGE IN BARRELS			**9,066,100**	**14,397,500**	

*Represents total plant which is operated by company shown but includes interest of other plant owners.

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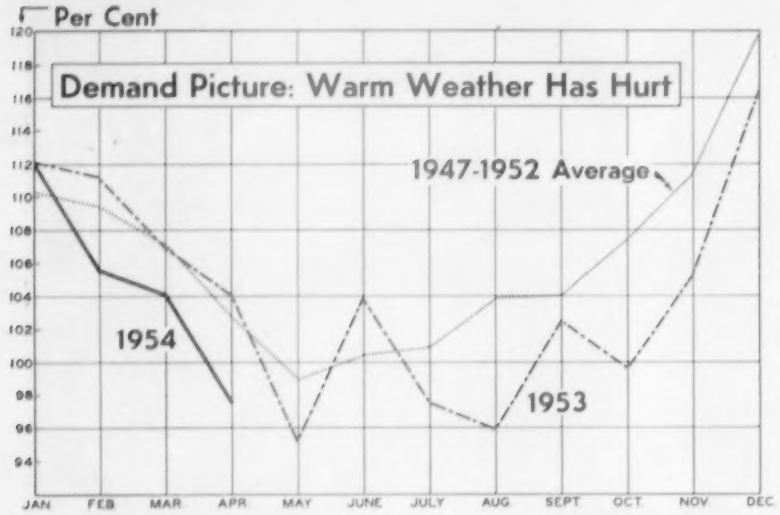

Demand Disappointing

Warm winter weather cut heating-oil demand, but poor market performance in April hints at a below-par year

John C. Casper

TOTAL demand for the first 4 months this year has been disappointing to the industry.

During the first third of the year, demand has averaged 8,420,000 bbl. daily—only 0.6 per cent more than in the same period in 1953. The increase is well below the widespread forecasts of a gain of 3½ to 4 per cent for this year.

The poor performance of the market is largely explained by a warm winter and its accompanying low heating-oil demand, but the arrival of April failed to see a big expected pickup.

Current weekly statistics indicate a lower level of demand in April than in the same month last year. Not all of the drop can be charged to a decrease in consumption of heating oils.

A loss of about 100,000 bbl. daily is indicated for residual fuel and about half that much for middle distillate. If weekly production and stock figures for gasoline are correct, total demand for gasoline in April represented an increase of only about 1 per cent over April last year.

Total demand for the first 3 weeks of May, based on weekly statistics, averaged slightly less than for the same weeks last year, and unless the movement of gasoline out of primary storage took a big jump in the last week of the month, the average for the entire month may be down from the low level of last year.

Deceptive comparison . . . For the next few months, comparisons of 1954 and 1953 demand may tend to cloud rather than throw light on the somewhat muddled demand picture.

Demand dropped sharply last May, then rose abnormally in June *(see chart)*. This big jump was due to heavy buying between the mid-June crude-oil price increase and the higher product prices at the end of the month. In view of this wide range in demand last spring, a decrease this year compared with last May will be much more indicative of low demands than a decrease in June.

Since the advance buying that produced the high level of demand last June was followed by slack periods in July and August, any drop below the previous year for these months will indicate a definite break in the demand trend.

'53 increase off . . . Last year, as the chart shows, all months from July to the end of the year fell below the 1947-52 average. This indicates that the increases for these months were less than the postwar normal on a percentage basis.

This also shows up in a comparison with corresponding periods of the previous year. Total demand for the first 6 months of 1953 was up 6.5 per cent from the same months of 1952. In contrast, the last half gain over the corresponding period of 1952 was only 1.9 per cent.

Cold weather in the last half of January, pushed demand for that month high enough to give it an above-average increase, but the points for the other months of this year fall below

In the chart . . .

THE accompanying chart shows comparisons of total demand for crude and products. Points for each month were found by dividing daily average demand for that month by the daily average demand for the entire previous year, with the result expressed as per cent.

The 1947-52 curve represents the average of individual curves for those years. Note that in the average postwar year, demand in January was about 10 per cent greater than the average for the entire previous year. Demand in December was about 20 per cent greater.

Demand data plotted in barrels daily would produce curves similar to those shown on the chart, but the lines would be too far apart for good visual comparison.

The use of a percentage scale also has another advantage in that it shows comparisons of percentage gain. If most of the monthly points for a particular year fall below the curve of a reference period, that year was a poor year, compared with the reference period.

The 100-per-cent line represents the average demand for the year preceding that shown by any curve. Any month with a point plotted above 100 had total demand above the average for the entire previous year.

Total demand decreases in warm weather, but the normal year-to-year gain in consumption tends to keep average demand for most of the summer months above the previous year's average. Note that in the postwar period 1947-52, only May fell below the 100 per cent line. This indicates that on an average, total demand in May was less than the average for all of the previous year.

Even the May average would have been nearer the 100 mark except for the low level of demand during the refinery strike in May 1952.

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TWELVE powerful, compact Nordberg four-cycle *Supairthermal* Engines will provide a total of 22,680 hp for pumping stations along the Lakehead Pipe Line Company line from the Canadian border to Superior, Wisconsin, and from there to Sarnia, Ontario.

Six of these Nordberg engines, such as the three shown in the view above, are each rated 1780 hp, for the Lakehead extension line from Superior to Sarnia. The other six *Supairthermal* pumping engines, each rated 2000 hp, will be installed in pairs in three stations on the pipe line from the Canadian border to Superior.

This is one more outstanding example of the ever-increasing use of Nordberg *Supairthermal* Engines, in Diesel, Duafuel® and Spark-Ignition Gas types, from 535 to 5000 hp, to provide compact, heavy duty, economical power for the petroleum industry. Write for further information, outlining your power requirements.

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the 1947-52 typical curve, indicating that the demand totals either represented decreases from the previous year or that the percentage increases were not up to the postwar average.

The year 1949 was not plotted on the chart as a separate line but all of the points, representing monthly demand totals, for that year fell well under the postwar average curve. Total demand for the year 1949 represented a slight decrease from 1948. The line for the first 4 months of 1954 falls between the low record for 1949 and the average for the postwar years 1947-52.

Forecast Revised

Bureau of Mines now says demand increase this year will be smallest since 1949; refinery runs estimate cut sharply

Bertram F. Linz

WASHINGTON.—Demand for domestic oil this year will fall drastically short of early 1954 expectations, it was warned last week by the Bureau of Mines.

The gain in 1954 over 1953 now is foreseen as the smallest since 1949. Bureau officials consider the slowdown in expansion a temporary phenomenon. They attribute it to heavy above-ground stocks, which now are being whittled down east of California, together with the 1953 drop in industrial activity and unseasonable weather early this year.

Normal weather in the last quarter of this year, compared with the mild weather with which 1953 ended, and some improvement in the industrial demand for oils that showed a sharp relative decline in the final quarter last year should place the industry in a favorable position for 1955 operations, they commented.

New figures . . . In a revision of its original 1954 forecast issued last December the bureau now estimates domestic production of all oils this year at 7,175,000 bbl. daily, an increase of only 45,000 bbl. over the 1953 actual of 7,130,000 bbl., instead of 7,266,000 bbl. or an increase of 136,000 bbl.

The increase in imports also will be less than originally expected, and will be 16,000 instead of 46,000 bbl. above the 1953 daily average of 1,050,000 bbl.

Estimates of crude runs to stills have been cut sharply and are now figured at 7,041,000 bbl. daily instead of 7,156,000 bbl., or 41,000 rather than 156,000 bbl. over the 1953 average of 7,000,000 bbl. a day.

The 1954 domestic demand now is expected to be 7,882,000 bbl. daily, an increase of 252,000 bbl. over last year's actual of 7,630,000 bbl., but last December the bureau foresaw that demand at 8,030,000 bbl., an increase of 400,000 bbl.

Exports, now estimated at 321,000 bbl. daily against 402,000 bbl. last year, will be somewhat above the original estimate of 310,000 bbl. a day but are expected to be cut back when Iranian oil again comes on the world market.

Total demand now is expected to be 8,203,000 bbl. daily this year, an increase of only 171,000 bbl. over the 1953 actual of 8,032,000 bbl. and far below the December forecast of 8,340,000 bbl. or an increase of 308,000 bbl.

The bureau explained that the smaller relative gain in required new supply now foreseen is related to an increase of 54,000,000 bbl. in total oil stocks in 1953, compared to the forecast of an increase of 14,000,000 bbl. in 1954.

But even the small gains now anticipated, it is pointed out, are based on the assumption of normal weather and greater industrial activity in the final months of this year.

Import Estimates Cut

Texas Co., Jersey Standard say they will bring in less

AUSTIN.—The Texas Co. and Standard Oil Co. (N.J.) have notified the Texas Railroad Commission of their intention to cut imports substantially over the remainder of the year.

Standard's Eugene Holman, chairman of the board, notified the commission last week that Esso Standard would reduce its imports 14,000 bbl. daily for the rest of the year.

Texaco announced that it would cut back by about 14 per cent. June import estimates given by these firms to the commission at the May state-wide allowable hearing were 73,167 bbl. of crude and products for Texaco and 210,000 bbl. for Standard.

Texaco's 14 per cent reduction would be in the neighborhood of 10,300 bbl. E. O. Thompson, chairman of the commission, said last week that Gulf Oil Corp. and Sinclair Oil Corp. were considering taking similar steps to reduce imports.

Gulf's import estimate for June was 131,000 bbl. of crude and produts daily, while Sinclair's was 66,000 bbl. daily.

Announcements of company action followed receipt of letters written by Thompson to all major United States oil importers asking that they reexamine import needs for future months. Thompson in the letter declared that the present domestic producing capacity at the most efficient rate is more than 1,500,000 bbl. daily over what is presently permissibly produced.

WEST COAST

Nevada Test Near Completion

ELY, Nev.—While it will be about 2 weeks before pumping equipment can be installed, Shell Oil Co.'s 1 Eagle Spring Unit has indicated it will be Nevada's first oil well.

The company last week reported the wildcat would not flow but that swabbing tests showed oil to be entering the hole at a satisfactory rate.

Drilled to 10,358 ft. and plugged back to 6,730 ft., 7-in. casing had been set at 6,450 ft. Oil production is from the open-hole interval, 6,450-6,730 ft.

Gas Found in Washington

LOS ANGELES.—Gas production in the State of Washington was found last week by Continental Oil Co., but the wildcat discovery was considered noncommercial.

Continental perforated its 1 E. A. Sims at 2,571-93 ft. and obtained a dry-gas flow at the rate of 50,000 cu. ft. per day. Shut-in pressure was 1,700 psi. The wildcat was in Grays Harbor County 8 miles northeast of Aberdeen in 31-19n-8w. Production was from lower Miocene rocks.

The rig has been moved about 9 miles to the north to begin another test.

At present there is no commercial production in the state.

Ohio Drilling Out Cement

BAKERSFIELD, Calif.—Ohio Oil Co. last week was drilling out cement at 15,825 ft. in its deep test in Paloma field.

The company had set 5½-in. casing at 17,222 ft. in preparation for testing a potential oil sand above 17,130 ft. After cleaning out to about 17,158 ft., perforating will be started.

If no trouble is encountered, the company expects to begin testing early this week.

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Texas Units Approved

Railroad Commission approves gas and water injection, unitization plans for Nona Mills and Quien Sabe fields

AUSTIN.—Texas Crude Oil Co. last week was given notice of Texas Railroad Commission approval for unitization of all working and royalty interests in all producing Yegua sand formations in Nona Mills field, Hardin County, Texas.

Gas injection into the "I" and "G" sands underlying the 2,500-acre unit area is expected to yield an additional 2,000,000 to 3,000,000 bbl. of crude and condensate.

Another unitization program in Quien Sabe field, Webb County, also was given the go-ahead by the commission. The agreement, covering 2,747 acres in the field, was submitted by Killam & Hurd, Inc. It is estimated that gas and water injection into the Quien Sabe sand would result in the recovery of an additional 1,000,000 bbl. of oil.

In addition to the unitization projects, the commission handed out permits for seven new water floods and for expansion of four existing projects.

The new projects were proposed by:

. . . **Buckles & Hostetler** for the 1,690-ft. Yates sand underlying 13 leases in Pecos Valley High Gravity field, Pecos County. Seven injection wells.

. . . **W. T. Waggoner Estate** for the 1,050-ft. Cisco sand underlying three leases in Wichita County Regular field, Wichita County. Ten injection wells.

. . . **Standard Oil Co. of Texas** for the 1,800-ft. chalk underlying two leases in Howard-Glasscock field of Howard and Glasscock counties. Three injection wells.

. . . **Shell Oil Co.** for the 1,800-ft. chalk underlying its Dora Roberts "B" lease in Howard-Glasscock field. Three injection wells.

. . . **Pemeta Oil Co.** and Jesse L. Douglas for the 695-ft. Bluff Creek and Tannehill formations underlying four leases in Shackelford County Regular field, Shackelford County.

. . . **Delhi Oil Corp.** for the 1,200-ft. Soma sand underlying five leases in Noelke field, Crockett County.

. . . **Woodson Oil Co.** for the 3,900-ft. Strawn in Manning-Harrington field, Throckmorton County. Six injection wells.

Expansions of existing projects were backed by:

. . . **Skelly Oil Co.** for the 2,800-ft. Yates sand underlying its S. N. Halley lease in Emperor field, Winkler County. Thirteen injection wells.

. . . **Gulf Oil Corp.** for the 2,900-ft. Grayburg dolomite underlying its J. T. McElroy lease in McElroy field of Crane and Upton counties. Four injection wells.

. . . **H. A. and M. B. Johnson** for the 1,300-ft. and 1,500-ft. reservoirs underlying six leases in White Creek field of Live Oak County. Eleven injection wells.

. . . **H. A. and M. B. Johnson** for the 700-ft. Calliham sand underlying three leases in Calliham field, McMullen County. One injection well.

Co-op Plan Aired

Commission considers first plant under new authority

AUSTIN.—The Texas Railroad Commission has held its first hearing under authority granted it by the legislature to approve agreements for construction and operation of cooperative facilities for extracting liquids from natural or casing-head gas.

The agreement submitted by Southern Production Co. for approval concerned operation of the new Pledger Field gasoline plant in Brazoria County. The plant, with a processing capacity of about 190,000,000 cu. ft. of gas daily, began operation in February and now is operating at near capacity.

The agreement provides for sale of gas to the plant by operators in the field. The plant remits 70 per cent of the net proceeds of the liquid products to the operators. Ownership of residue gas remains with the operators who may sell it however they wish.

The operator's share of liquid products is determined on a basis of acre feet of productive sand. The contract has been executed by the five largest producing companies in the field — Southern Production Co., Humble Oil & Refining Co., Sun Oil Co., Union Producing Co., and Gulf Oil Corp., which own 99 per cent of the working interest in the field. Other producers may sign on the same yardstick basis before to August 1 of this year.

There is a charge to the operator for use of the plant gathering system based on operating expenses compared to the operator's plant throughput.

Injection no feasible . . . The so-called cooperative-facilities article passed by the legislature provides that an agreement such as the Pledger Field plant contract can only be approved if secondary-recovery operations are no feasible or necessary.

Dick T. Fenwick, manager of the production and operations department of Southern Production, said secondary-recovery operations are not feasible because of the extremely lean nature of the gas, because the reservoir is a water drive rather than a depletion type, and in view of the pressure history of the field.

The Pledger plant, a high-pressure absorption type, processes wet gas from 33 wells producing from the Marginulina and Frio sands at about 6,800 ft. The plant currently is processing about 175,000,000 cu. ft. daily.

Recoveries of liquids amount to about 24 bbl. per million cubic feet, or a total daily output of about 4,200 bbl. per day. Total ultimate liquids extracted will come to about 22,000,000 bbl., Southern Production estimated.

Drilling Boom On

Two strikes boost activity in Edwards Plateau area

SAN ANGELO, Tex.—Discovery of two Pennsylvanian Strawn pools in the Edwards Plateau region of southern West Texas has resulted in a small drilling boom for the immediate area, plus a full-scale boom in royalty sales.

First discovery was Stanolind Oil & Gas Co. 1 Hoblett & Jacobs, located 5 miles south of the town of Christoval in southern Tom Green County. It was completed in March for a flowing potential of 242 bbl. of oil through 12/64-in. choke. Pay was a reef section between 5,502-12 ft. The new strike has been named the H. J. (Strawn) field.

Royalty interests which were lagging at $50 an acre prior to the strike, have gone as high as $300 an acre. Reasons are a second flush producer for the new pool, plus another strike just south of Christoval.

Town lot owners in Christoval were reported doing a brisk business in selling oil lease rights, and there was interested speculation that Tom Green County might offer a royalty sale on its 1,100-

acre county park ajoining Christoval on the south.

Offset and extension . . . Humble Oil & Refining Co. 1 Joe Funk, ⅜-mile southeast of the discovery, added considerable fuel to the situation. This well perforated the reef between 5,510-40 ft. and completed for a daily potential of 478 bbl. Tubing pressure was 650 psi., indicating a good gas-oil ratio.

Second strike . . . Caroline Hunt Trust Estate 1 Emmett Jacobs, just south of Christoval, filed its completion gage as the second discovery. This well drilled into Strawn pay at 5,629 ft., and on potential test gaged 335 bbl. of oil a day through ¼-in. choke from perforations at 5,650-62 ft. Tubing pressure was 600 psi. and gas-oil ratio was 1,286 cu. ft.

Early applications for offsets or extensions in the new area included two stepouts by Stanolind and one by Humble offsetting its 1 Joe Funk. Stanolind will drill 1-B Anson southwest of the discovery, and 1-A Anson east of the discovery. Humble 3 Joe Funk will be a southeast offset to its confirmation well in the new pool.

SACROC Progress

Water-injection system to be completed by July 1

DALLAS.—Installation of the water-injection system for the huge SACROC unit pressure-maintenance project in Kelly-Snyder field of Scurry County, West Texas, should be completed by about July 1.

Water injection into the entire Canyon Reef section above the water-oil contact will begin immediately thereafter, according to E. L. Anders, chief engineer for the SACROC unit.

Anders disclosed that the long-delayed project is nearing the kickoff point while testifying before the Texas Railroad Commission. He was appearing in support of unit applications for the transfer of allowables of three wells in the field slated for injection service.

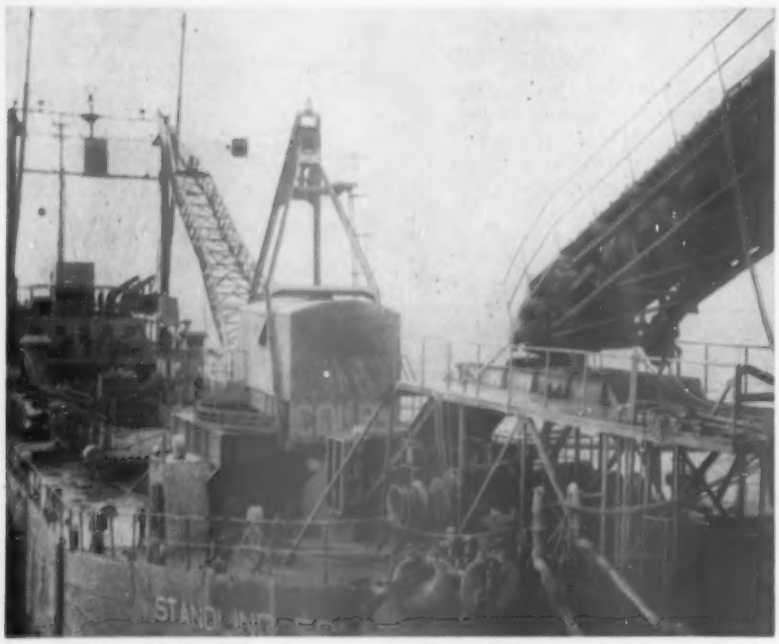
The SACROC application was opposed by Gillis Johnson, attorney for W. A. Moncrief et al., Fort Worth. The Moncrief interests, whose properties lie on the eastern edge of Kelly-Snyder, have opposed the SACROC pressure-maintenance plan since it was submitted to the commission. A suit challenging constitutionality of the commission orders approving the unit agreement and field rules is now before the 126th District Court in Austin.

The SACROC unit takes in nearly 50,000 productive acres in Kelly-Snyder and is the world's biggest waterflood project (excepting that in East Texas field) from the standpoint of acreage and of additional oil estimated recoverable.

The SACROC unit flood plan calls for a line-type system and for gas injection at the northern end of the field. Moncrief objects to the crestal water flood and to a proposal for a bonus allowable based on amount of water injected, backing instead a plan for gas injection along the crest and for water injection along the edge of the field below the oil-water contact.

Plan underground storage . . . Anders also told the commission that underground cavities for L.P.G. storage are planned in connection with the big Snyder natural-gasoline plant. The cavities would be created by washing out a salt section in the area with about 12,200 bbl. of water daily, he said.

This wash water, he said, has been made available to the unit for injection. It would be sufficient, together with the proposed transfer of allowables of the three input wells, to reduce reservoir voidage by an amount equivalent to withdrawals for 2.69 producing days from the SACROC unit.



First Texas Test on Federal Tidelands Under Way

Stanolind Oil & Gas Co. is drilling ahead on a 13,000-ft. wildcat which is the first undertaken beyond the 3-league limit since the settlement of the tidelands-ownership dispute. Stanolind is using an 83 by 82-ft. template-type platform supported by nine pilings and served by a converted LST. If the test is successful, three other wells will be drilled from the platform. Location is in 55 ft. of water 19 miles from nearest land and 25 miles due east of Galveston. The well is being drilled by Loffland Bros., Tulsa-headquartered drilling contractor. The platform was fabricated by Brown & Root, Inc., Houston, and was designed to accomodate four wells, all in a row, with the rig to be skidded to a new location after completion of a well. The big gantry crane near the bow of the LST handles heavy equipment and drill pipe. The Texas offshore wildcat is designated as Stanolind's State Tract L-141, OCS-0273.

Boom-Town Museum Planned

ODESSA, Tex. — The oil industry will build one more boom town in West Texas.

The "town," an assemblage of old buildings and historical oil-field equipment, will be a feature of the Permian Basin Oil Show, to be held here October 14-17.

As contributions add to the collection, it is planned to develop the boom town into a permanent oil museum. If long-range plans are fulfilled, different buildings will house different types of oil-industry relics.

Delaware Basin Test Hits

MIDLAND. — Progress reports on two Reeves County, West Texas, wildcats show two important developments. Both tests are well within the known limits of the Delaware basin.

Gulf Oil Corp. 1 Toyah Unit, northeast of the town of Toyah, flowed gas on a drill-stem test in Devonian dolomite between 12,672-12,747 ft. Gas reached the surface in 6 minutes, and

in 10 minutes was flowing at the daily rate of 4,270,000 cu. ft. At the end of 1 hour the flow had increased to 7,000,000 cu. ft. daily. Recovery in the pipe was gas-cut mud with no shows of oil or water. Bottom-hole flowing pressure was 2,065 psi.

Operators placed sample top on the Devonian at 12,553 ft., minus datum point of 9,730 ft. Electrical surveys were run to 12,747 ft. before setting casing to drill ahead.

Gulf 1 P. G. Northrup, southeast of Pecos, was drilling ahead in lime and shale at 16,744 ft., a new depth record for West Texas and Southeast New Mexico. Old total depth of 1 Northrup was 16,696 ft.

Unit Rules Issued

Data needed for issuing field scheduled outlined

AUSTIN.—The Texas Railroad Commission last week issued an order setting forth requirements which must be met before its proration department can issue a unitized field schedule.

Under the new regulation, the commission will issue the first schedule for a unit operation on the first of the month following a 30-day lag from the date the commission approves the unit agreement.

A unit operator, under the new rules, must submit information both to the proration department in Austin and to the district office.

That sent to the proration department must include:

. . . **A code sheet** (six copies) setting out the name of the old operator, the lease, and the well number; and that of the new operator, lease, and well number.

. . . **Before and after plats** (six copies) showing properties as they existed prior to commission-approved unitization and after such unitization.

That data submitted by the operator to the district office must include:

. . . **An SW-1 form** for each gatherer from the unit covering the new unit name.

. . . **A code sheet and unit plat** for each SW-1 submitted.

. . . A supplemental code sheet and plat for district office and unit gatherer, in the event there are new additions to the unit.

Phillips Tops Lease Bids

AUSTIN.—The University of Texas Permanent School Fund realized another $4,431,000 from the recent auction of oil and gas leases on about 36,000 acres of West Texas school lands.

Phillips Petroleum Co. topped all individual bids, offering $310,000 for 318 acres in Andrews County. All told, Phillips paid $1,253,500 in bonuses for leases on 25 tracts.

Second high individual price was paid by Humble Oil & Refining Co.—$250,000 for a 161-acre block in Andrews.

Total receipts from the sale were considerably short of the record $16,238,000 of an earlier sale.

CANADA

Six Named to Board

Temporary group appointed for Alberta gas pipeline

EDMONTON, Alta.—Six of the seven men who will act as the provision board of directors for the Alberta Gas Trunk Line Co., have been named. Premier E. C. Manning said consent of the seventh man has yet to be received.

The men appointed are Ralph Willis, N. E. Tanner, W. Harrison and Vernon Taylor, all of Calgary; Ronald Martland, of Edmonton; and George Church of Balzac, Alta.

Willis is an independent employer. Tanner is president of Trans-Canada Pipe Lines (company which has the export permit for eastern Canada and the Minneapolis area) and Merrill Petroleums. Harrison is president of the Western Canada Petroleum Association. Taylor is an Imperial Oil official. Martland is a prominent Edmonton attorney, and Church is a former president of the United Farmers of Alberta.

The provisional board will act until the voting stock is distributed and a permanent board can be elected. The producers will name three members of the permanent board, the gas companies one, the export companies one and the provincial government two.

The special legislative act under which the board is set up provides for issue of two types of stock. The voting stock, "very restricted," would be confined to producers, gas and export companies. The non-voting stock, to be sold to anyone, would be issued to raise a maximum of $40,000,000 for capital expenditures.

20-Well Program Planned

REGINA.—Nuco Petroleums, Ltd., has announced that a drilling contract for a 20-well program in the Dulwich heavy gravity oil pool in the Marshall area of Saskatchewan has been granted to Thomas A. Roberts of Edmonton. Work is expected to commence immediately.

Interest in the development program is divided 30 per cent to Porosity Petroleums, Ltd., 20 per cent to each of New Devon Petroleums, Ltd., Fair Oil & Gas Ltd., and Nuco Petroleums, Ltd., and 10 per cent to Do-Mor Petroleums, Ltd.

Alberta Leases Sold

Sturgeon Lake competition sets new record for income

EDMONTON, Alta.—Alberta's second 1954 sale of oil and gas crown leases and reservation rights was marked by competition for rights in the Sturgeon Lake field in the Peace River district, Alberta's most northerly field.

The sale netted the government $14,829,868. Combined with the $31,675,042 received for "hot" Pembina field properties earlier this year, the proceeds for 1954 so far more than double the amount last year and breaks the record of $35,400,000 received in 1950.

Highest price paid in the recent sale was $1,843,500 by Shell Provincial Exploration for reservation rights in the Swan Hills region. This is 100 miles northwest of Edmonton and is virgin oil country.

Shell Oil Co. of Canada, Ltd., paid $1,105,111 for 320 acres of lease rights in the Sturgeon Lake field, about 175 miles northwest of Edmonton.

Third highest price of the sale—$935,600—was paid by Union Oil Co. of California for another parcel in the Swan Hills region.

Luscar Coals, Ltd., paid the highest price for an oil and gas lease in the Pembina region with a bid of $490,123 for 161 acres. Another Pembina lease brought $475,021 from Mountain Park Coals, Ltd.

Three parcels of 160 acres each were sold in the proposed townsite of Drayton Valley, the community planned as a model town. Oilwell Operators, Ltd., paid $152,691 for each of two parcels, while Dome Exploration Western, Ltd., Western Canada Petroleums, Ltd., and Compagnie Francaise des Petroles paid $101,000 for the remaining lease.

The government has stipulated that drilling must start before September 1, giving the firms a chance to bring in wells before buildings or roads are built over potential producers.

Crude Record Broken

World output zooms to new high of 12,352,100 bbl. daily in March; Kuwait tops 1,000,000 bbl. daily for first time

Dahl M. Duff

PRODUCTION of crude oil throughout the Free World soared to a new high in March. Output records were established in Kuwait and Saudi Arabia while the United States showed a substantial gain.

Free World production during March averaged 12,352,100 bbl. daily, up 278,100 bbl. daily from the previous month. This higher production rate raised output for the first quarter of 1954 to 12,100,900 bbl. daily. The first quarter rate represented an increase of 427,900 bbl. daily, or 3.7 per cent over the corresponding quarter of 1953.

Of the increase from February to March, 127,800 bbl. daily was in the United States, where production rose to an average of 6,506,500 bbl. daily from 6,378,700 bbl. daily. Foreign producing areas yielded 5,845,600 bbl. daily in March against 5,709,300 bbl. daily the previous month. This gain accounts for the remainder of the total Free World increase.

United States still lagging . . . First quarter figures again told the story of a lagging production in the United States compared to sharp gains abroad, especially in the fields of the Middle East. This has been the longer-term trend for several years, although it has at times been obscured in the month-to-month fluctuations.

In the first 3 months of this year, United States production averaged 6,375,000 bbl. daily. This is 174,000 bbl. daily below the production in the first quarter of last year, and 91,000 bbl. daily under the average domestic production for all of 1953. The depressed output in the United States in the first quarter was due to particularly low domestic total in January.

Foreign output up . . . On the other hand, foreign production in the first quarter of 1954 averaged 5,725,700 bbl. daily, or around 11.9 per cent higher than output in the corresponding quarter of 1953. First quarter foreign production showed a gain of 7.3 per cent over average production for all of last year.

The bulk of the gain in foreign production is accounted for in the Middle East since the increases in Latin America have been relatively small. Behind the rapidly rising Middle East production lies the fact that foreign oil consumption is increasing at a more rapid rate than in the United States, and the fact that Middle East crude is moving into markets in the Western Hemisphere. Some officials feel that the recent sharp gain in oil production abroad was due in part at least to apprehensions caused by the critical Indo-China situation.

The Middle East . . . Production in this region climbed to a new all-time high in March. The total was 2,767,800 bbl. daily, 217,200 bbl. daily or 8.5 per cent above the previous month. For the first quarter, the Middle East averaged 2,603,200 bbl. daily. This was

TREND OVER THE LAST YEAR

	W. Hemisphere less U.S.	Middle East	Total non-Communist foreign
1953—			
April	2,448.1	2,426.8	5,306.6
May	2,423.1	2,523.7	5,391.0
June	2,459.4	2,536.0	5,450.1
July	2,487.7	2,534.0	5,471.9
August	2,443.3	2,489.0	5,387.3
September	2,485.7	2,416.4	5,345.3
October	2,519.5	2,528.1	5,511.5
November	2,651.9	2,341.7	5,461.6
December	2,711.9	2,540.2	5,714.1
1954—			
January	2,682.8	2,491.2	5,636.4
February	2,703.7	2,550.6	5,695.3
March	2,622.6	2,767.8	5,845.6

CRUDE-OIL PRODUCTION
(Daily average in thousands of barrels)

Country—	March 1954	February 1954	March 1953
W. Hemisphere:			
Argentina	85.0	84.5	78.3
Bolivia	5.0	4.6	1.4
Brazil	2.1	2.2	2.9
Canada	215.3	260.0	161.3
Chile	4.6	4.7	3.1
Colombia	113.5	114.5	113.2
Cuba	0.1	0.1	0.1
Ecuador	8.4	8.3	7.9
Mexico	205.0	206.0	215.8
Peru	48.0	47.5	42.4
Trinidad	63.6	63.4	61.0
Venezuela	1,872.0	1,907.9	1,718.5
Total	2,622.6	2,703.7	2,405.9
W. Europe and Africa:			
Algeria	1.6	1.5	1.6
France	7.3	7.3	6.7
Fr. Morocco	2.5	2.3	2.0
W. Germany	48.9	48.0	39.3
Italy	1.6	1.6	1.9
Netherlands	16.6	15.6	15.5
Egypt	35.0	36.0	47.4
United Kingdom	1.2	1.3	1.1
Total	114.7	113.6	115.5
Middle East:			
Bahrain	30.1	30.1	30.1
Iran	45.0	57.2	22.4
Iraq	595.8	598.1	458.5
Kuwait	1,012.2	820.4	771.0
Neutral Zone	6.9	6.5	...
Qatar	98.8	96.8	74.9
Saudi Arabia	978.3	940.9	804.2
Turkey	0.7	0.6	0.6
Total	2,767.8	2,550.6	2,161.7
Other Asia:			
British Borneo	102.0	102.0	101.9
Burma	3.5	3.5	2.5
India	6.8	6.8	6.0
Indonesia	215.0	201.7	185.2
Japan	5.9	5.9	5.7
New Guinea	4.8	4.8	4.9
Pakistan	2.5	2.5	3.8
Total	340.5	327.4	310.0
Total, non-Communist foreign	5,845.6	5,695.3	4,993.1
United States	6,506.5	6,378.7	6,530.9
Total Free World	12,352.1	12,074.0	11,524.0
Est. Russia & E. Europe:			
Russian Zone, Austria	62.0	62.0	60.0
Romania	110.0	110.0	90.0
Russia	1,085.0	1,085.0	1,010.0
Other Communist	34.1	34.1	28.8
Total	1,291.1	1,291.1	1,188.8
World total	13,643.2	13,365.1	12,712.8

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these regions. Estimates also have been made for certain other countries, particularly in Southeast Asia, for which completely current reports are lacking. Iranian production shown is net output, the gross less recycled material. Other Communist includes China and Yugoslavia as well as the Soviet satellite countries in Europe.

344,200 bbl. daily, or 15.3 per cent, above the average for the first quarter of 1953.

The two largest producing countries in the Persian Gulf area both established new all-time production records in March. Kuwait hit 1,012,200 bbl. daily, marking the first time output in any individual country in the Middle East has gone above the million-barrel daily mark. The increase in Kuwait over February was 23.4 per cent.

In the first quarter, Kuwait's production averaged 877,000 bbl. daily. Month-to-month variations in Kuwait's output of 100,000 to 150,000 bbl. daily or more are not unusual. Much of these short-term changes are due to scheduling of tankers and weather conditions during the month at the loading terminal. The first-quarter production in Kuwait was about 86,000 bbl. daily or 10.8 per cent higher than the same quarter of last year.

Saudi Arabian production rose 37,400 bbl. daily to reach 978,300 bbl. daily. First-quarter production in Saudi Arabia was 20.5 per cent over the same quarter of 1953. Saudi Arabia was passed last year by Kuwait as the No. 1 oil country of the Persian Gulf. However, Saudi Arabia's current high production level has taxed pipe lines and other facilities to the utmost. Early this year, Arabian American Oil Co. airlifted pumps from the United States for emergency expansion at the Qatif pipeline junction.

The Neutral one between the two countries produced a reported 6,900 bbl. daily in March. This low level of output for the second consecutive month was apparently due to the Saudi Arabian Government's refusal to allow Pacific Western Oil Co., its Neutral Zone concessionaire, to ship oil through the terminal in Kuwait. American Independent Oil Co. also was reported having difficulties making long-term marketing arrangements for its Neutral Zone production.

In Zubair field in southern Iraq, output rose another 4,200 bbl. daily to hit a record 87,000 bbl. daily. A new 26-in. pipeline to the tanker terminal is making higher Zubair production possible. Net Iranian production—all by the National Oil Co.—slipped back from its high February level. The March output rate as reported still represented more than estimated internal consumption plus the few export sales made.

Western Hemisphere . . . Venezuela dropped back nearly 36,000 bbl. daily in March. The month's average of 1,872,000 bbl. daily gave a first quarter total of 1,896,400 bbl. daily. This was 131,000 bbl. daily above the average for 1953, which was an unusually poor year for the Venezuelan producing industry.

Crude production in Peru reached its highest level since the war years. The March total of 48,000 bbl. daily followed the sharp dip in January when oil output in this country fell to less than 40,000 bbl. daily. Peru's immediate oil future hinges on the results of exploration now under way. The main existing field, La Brea Parinas, is showing signs of depletion.

Another production record was established in Trinidad. Small and gradual increases in that British colony have lifted output above the war-time peak. Colombian crude production continued at the limit of pipeline and refinery facilities. The month's total included 927 bbl. daily by Intercol, 49,087 bbl. daily by Shell, 5,002 bbl. daily by Texas, 33,389 bbl. daily by the Empresa, and 25,144 bbl. daily by Colpet.

Europe and North Africa . . . One of the most abrupt changes in recent months has occurred in Egypt. One of the two Sinai fields of Anglo-Egyptian and Socony-Vacuum suddenly dropped off, and total production in the country was down about 12,000 bbl. daily. Company officials have long warned Egyptians such a decline was to be expected.

West German production was just under the 50,000-bbl.-daily mark. Steady production increases have been made for the last 5 years. This turn of events is in sharp contrast with some of the gloomy predictions of the German producing industry made shortly after the war by American geologists advising the U. S. Government.

Some western oil observeers believe that Romanian crude production is much higher than the 110,000 bbl. daily shown in the table. However, this lower figure is supported by persons extremely familiar with the Romanian oil industry. Furthermore, there is basis for believing that the Romanian Communists include the heat value of natural gas in the more than 200,000 bbl. daily which they are now claiming as their oil production.

Caltex Enters France

Company takes 45 per cent interest in government-owned firm, will explore 7,700-sq.-mile Paris basin concession

THE Caltex organization has entered an exploration venture in central France in a minority stock status with a government-owned French oil company.

The agreement under which the project will be carried out was authorized May 26 by the French Cabinet in Paris.

American Overseas Petroleum, Ltd., the Caltex exploration affiliate, will hold 45 per cent of the capital stock. The remaining, majority control, will be in the hands of Soc. Nationale des Petroles du Languedoc-Mediterranean. Sixty-five per cent of the latter company is owned by the French Government through the Bureau de Recherches de Petrole.

What is involved . . . The area involved covers some 20,000 square k., or about 7,700 sq. miles, centered roughly on Orleans, 75 miles south of Paris. The acreage is a complete wildcat prospect in which no previous wells have been drilled.

The Paris basin in which the concession is located is a different geological province from southwestern France where the French affiliate of Standard Oil Co. (N. J.) made a significant oil discovery about 2 months ago. The French company, Regie Autonome des Petroles, has done some drilling east of Paris in the basin, encountering shows in the Jurassic.

The stock ownership division makes the Caltex-Languedoc agreement of unusual interest. Information made available by French sources in Paris said that during the exploration period, Caltex would pay more than half the expenses of the operation.

Industry sources, however, said that other and more favorable features of the deal will come to light when full terms are published. Despite the stock ownership division, the company, it was understood, would receive a return more in line with its financial participation in the event the operation is successful.

Change possible . . . There has been speculation lately that the Jersey company's success with its first well might induce a change in the French policy requiring majority government or national control of oil operations.

Though government-financed French companies are spending several hundred million dollars in a search for oil, results have been poor. The only discovery of consequence prior to that

of Jersey Standard was in 1949 at Lacq, a field now producing about 6,000 bbl. daily.

Both Caltex and Conorada Petroleum Corp. negotiated for concessions in the Paris basin, but ran into French requirements for majority French ownership. Conorada backed off from such a deal. Most large oil companies insist on majority control of any exploration operation, thus retaining management rights. Foreign, private or state capital participation is often welcomed but at most as an equal partner.

Argentina Deal Made

Peron government agrees to development proposal offered by Atlas-Dresser; Jersey Standard makes exploration bid

A 25-YEAR oil-development contract was to be signed late last week in Buenos Aires by the Argentine Government and an American group consisting of Atlas Corp. and Dresser Industries, Inc.

Floyd Odlum, president of Atlas, a New York investment firm, said in Buenos Aires that an "agreement in principle" had been reached. Odlum and his associates in Dresser Industries earlier spent more than 2 hours with President Peron.

Another development pointing to possible participation of foreign capital in Argentina's long-closed petroleum industry was the disclosure that Standard Oil Co. (N. J.) has formally presented an exploration and development proposal to the government. Jersey Standard officials have been quietly studying the Argentine situation for the last several months. Royal Dutch-Shell and Standard Oil Co. of California also are investigating the prospects, but their studies are still in the preliminary stages.

Some details told . . . Provisions of the prospective Atlas-Dresser agreement were not detailed. Odlum said reports of a $100,000,000 investment were a "trifle high." He said the expenditure would be of the risk type and "we will receive payment for our work based on our accomplishments." The agreement will not be under the 1953 foreign investments law which limits remittable profits to 8 per cent, but Odlum said the contract would conform to the constitution and that the Argentine congress would have a chance to approve it before investments are made.

The American investors will confine themselves to crude oil development, leaving refining and distribution to the government. Initial activities are to be carried out in the Neuquen area. DeGolyer & MacNaughton were identified as advisers to the group.

Pipeline planned . . . Odlum said that one of the principal provisions of the contract called for construction of a 400-mile, 16-in. pipeline from Neuquen to the terminal at Bahia Blanca. This $35,000,000 to $40,000,000 line should be completed in a year after approval of the contract, he said.

Dresser is a leading manufacturer of oil-field equipment in the United States. Its executive vice president, J. B. O'Connor, last August toured Argentina as guest of the government and later made a statement strongly emphasizing the investment prospects in Argentina for the oil industry.

It was assumed Atlas would provide financing, and Dresser would supply mainly equipment and technical assistance for the Argentine undertaking.

Import spending involved . . . Argentina's approximately 75,000 bbl. daily of production falls far short of meeting requirements, and the present outlay of about $300,000,000 a year for oil imports has been an important factor in the more receptive attitude of Argentine officials toward foreign capital.

Jersey Standard and Shell both carry on integrated operations in Argentina, with substantial refining and marketing interests. Their production in recent years has gradually declined with only the state-owned company, Yacimientos Petroliferos Fiscales, allowed to take new acreage.

Indications of a change in Argentina's policy came a year ago when high administration officials declared foreign private capital would be given an opportunity to participate in the petroleum industry. More recently, President Peron said pride in the nationalized oil industry was "false nationalism."

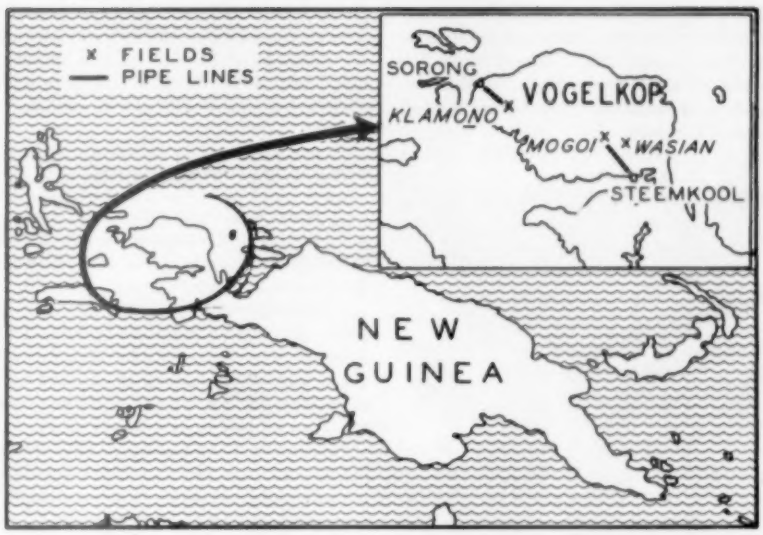
Terms not disclosed . . . Terms of the Jersey Standard offer were not disclosed, even in the most general outline. Hard bargaining is certain to precede an agreement. From what is known of the type of deal Argentina has in mind, there is some question whether any agreement at all is possible.

Previous statements of Argentine officials indicated the government is looking more toward a mixed-company arrangements or possibly drilling deals under percentage-of-production payment terms. Jersey Standard and other large international companies in the past have shown no interest in such contracts, insisting instead on the more conventional oil concession.

Report denied . . . Reports from Buenos Aires said Jersey Standard was offering to spend $200,000,000 in Argentina, but company sources in New York said nothing like this sum was involved.

Britain's Largest Oil Dock Now in Use

The Queen Elizabeth II dock, built at a cost equivalent to $14,000,000, is capable of accommodating four large modern tankers simultaneously. Located at Eastham, Cheshire, where the Manchester Ship Canal meets Mersey River, the dock is connected to Shell's Stanlow refinery by a 7-mile pipeline system. Shown here is the 28,000-ton Shell tanker, Velletia, passing into the dock at the formal opening earlier this year.



Jungle Line Finished

Two shut-in New Guinea fields served by 47-mile pipeline; island's production increased to about 15,000 bbl. daily

EIGHTEEN months of construction work in the difficult jungles and swamps of western New Guinea have resulted in the completion of a 47-mile pipeline outlet for two shut-in fields.

The fields are Wasian and Mogoi, located in the eastern part of the Vogelkop (bird's head) peninsula. The peninsula juts off the western end of the island of New Guinea. The two fields were discovered in 1940.

A third field in western, or Netherlands, New Guinea is Klamono, which was discovered 3 years earlier. Klamono has been producing steadily at about 4,800 bbl. daily since the completion late in 1948 of a 30-mile line linking the field with a terminal at Sorong on the western side of Vogelkop.

Production increased . . . Completion of the new line to move Wasian and Mogoi crude to an export terminal on the Muturi River is allowing production of 1,300 tons daily, or about 10,500 bbl., from these fields. Total New Guinea production has increased to about 15,000 bbl. daily.

A 6½-MILE STRETCH of the 47-mile pipeline recently completed in western New Guinea was constructed on a specially built pipeline trestle to lift it above the swampy terrain.

The operating company is Nederlandsche Neiuw Guinee Petroleum Mij., owned 40 per cent by N. V. De Bataafsche Petroleum Mij. (Royal Dutch-Shell), 40 per cent by Standard-Vacuum Oil Co., and 20 per cent by Far Pacific Investments, Inc. (Standard Oil Co. of California and The Texas Co.). The Shell company is the operator.

Route of line . . . The route of the new Wasian-Mogoi pipeline extends through the swampy territory of the Muturi River area and over the rough Tembuni range of hills. First stage of the project involved laying a 6-in. line from Wasian and Mogoi to a junction at Tembuni.

From Tembuni, an 8-in. line, some 37 miles long, was laid to Muturi Hill, 330 ft. high, where two more storage tanks, each of 22,000 tons or about 175,000 bbl. capacity, were installed. For the last 10 miles from Muturi Hill to the tanker terminal on the Muturi River, a 24-in. line was laid for gravity loading. The last stretch of coastal swamp, 6½ miles long, had to be crossed by a specially-constructed pipeline trestle.

Wasian and Mogoi both produce a light, waxy paraffinic crude of about 47° A.P.I. gravity from depths of 2,950 and 1,640 ft., respectively. At the beginning of this year, there were 5 shut-in oil wells in Wasian. Eight wells were completed in this field during 1953, six of them dry. Mogoi had 28 shut-in oil wells, and of the 22 wells completed in 1953, 18 were oil wells and four dry holes. Both fields are anticlinal structures with the production coming from Miocene limestone.

Coals to Newcastle

Sumatra crude processed in Persian Gulf, report shows

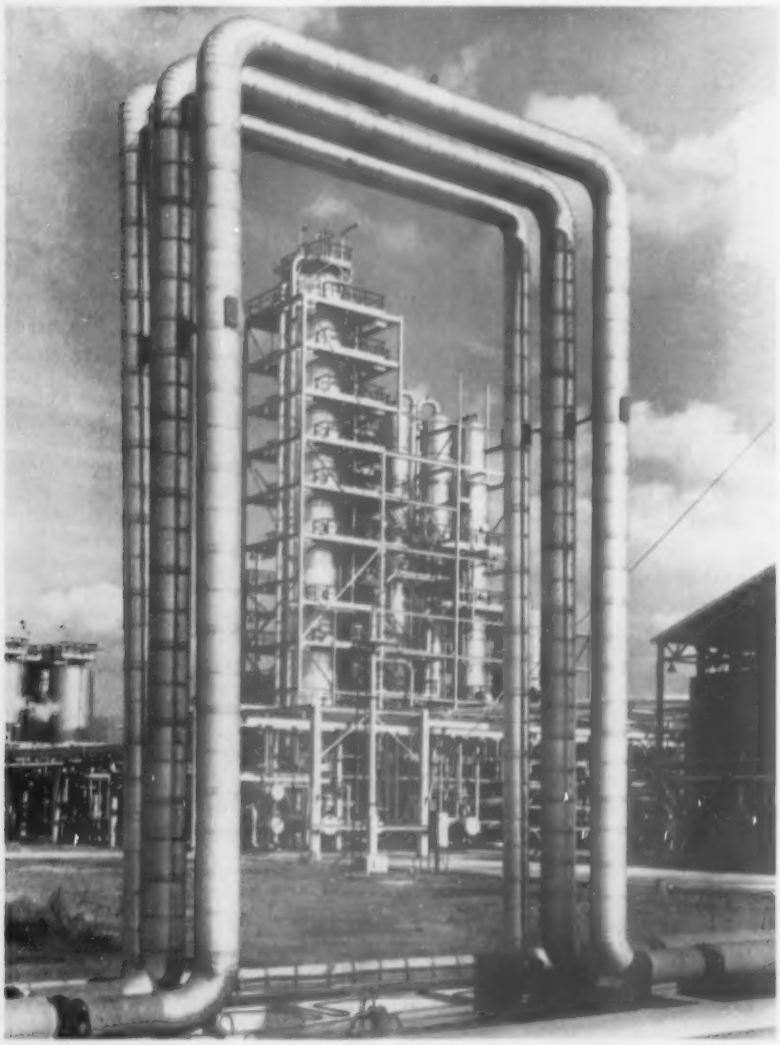
SUMATRA crude was hauled into the Persian Gulf the last 2 months of 1953 for processing at the Bahrain refinery of Bahrain Petroleum Co., Ltd.

This was shown in the summary of oil operations which was included in the recent 1953 report submitted by Bapco to the ruling shaikh of Bahrain. Figures on runs, yields, and crude sources for the Bahrain refinery showed that during the final 2 months of the year that plant processed 227,134 bbl. of Sumatra crude out of total runs of 13,713,541 bbl.

The Bahrain refinery has a nominal capacity of 205,000 bbl. daily and ranks as one of the largest in the Eastern Hemisphere. It handles the domestic Bahrain production, which in

1953 made up 11,043,755 bbl. of the refinery's throughput, plus additional Saudi Arabia crude, which in 1953 totaled 61,585,197 bbl. Total 1953 runs were 72,856,086 bbl., averaging 200,000 bbl. daily.

Bapco is a part of the Caltex group which is owned by Standard Oil Co. of California and The Texas Co. In Sumatra, Caltex has about 50,000 bbl. daily of production from Minas field in central Sumatra.



British Refinery Dedicated

THE 17,700-bbl. Coryton, England, refinery, which was completed last year by Vacuum Oil Co., Ltd., has been officially dedicated.

The operating company is owned 50-50 by Socony-Vacuum Oil Co., Ltd., and the British company, Powell Duffryn, Ltd., London. Construction of the refinery on the Thames Estuary 25 miles from London started 3½ years ago. Its completion was one of the first steps in the general program which raised the refinery capacity in the United Kingdom above 600,000 bbl. daily.

The refinery was formally opened by Britain's Queen Mother Elizabeth, who welcomed Americans as "comrades in the field of industry." She later unveiled a plaque commemorating her visit.

Americans present at the refinery dedication included Winthrop W. Aldrich, American ambassador, and B. Brewster Jennings, president of Socony-Vacuum. The Coryton refinery is the only major British refinery designed primarily for lubricating-oil production *(The Oil and Gas Journal, December 22, 1952, page 259)*. Facilities include 2,500 bbl. daily thermal cracking, and 10,000 bbl. daily catalytic cracking.

New Steel Introduced

A new steel claimed to be highly resistant to the corrosive action of hydrogen sulfide in oil and gas has been developed by two French companies.

Designated as APS 10 M4 or Pompey APS, the steel contains: carbon, less than .20 per cent; aluminum, less than 1 per cent; cromium, 1 to 5 per cent; molybdenum, less than 1 per cent, and manganese, less than 1.2 per cent.

Its chemical composition, heat treatment, and use for manufacturing oil-country tubular goods are covered by international patents. Given an appropriate heat treatment, the steel is said to have all required mechanical properties together with a high resistance to intergranular corrosion.

Pompey Steelworks and the Societe Lourvoil Montbard Aulnoye, a pipe manufacturer, jointly developed the steel after some costly accidents in the Lacq, France, region.

The first field application of casing and tubing made from the steel will be made this year. The new steel will be run in the highly corrosive natural gas wells in the Lacq area. Natural gas in the wells contain up to 18.5 per cent hydrogen sulfide.

Argentina Gets Red Imports

Argentine imports reports for February showed for the first time receipts of petroleum products from Russia.

The deliveries were made under the trade agreement signed last summer by the two countries. During February, Argentina received 4,869 tons (about 36,400 bbl.) of gas oil and 321 tons (about 2,860 bbl.) of gasoline from the Russian port of Batum on the Black Sea.

The total 5,190 tons from Russia, however, made up only a fraction of the total 386,629 tons imported by Argentina during the month. These imports, equivalent to about 97,000 bbl. daily, compares to about 117,000 bbl. daily in January and 93,500 bbl. daily in February 1953.

Argentina received 17,195 tons of gas oil from Cubacao during the month. Aruba sent 4,262 tons of motor fuel and Curacao 3,573 tons. Fuel-oil supplies from Cubacao totaled 69,103 tons, and from Caripito 20,254 tons. For crude, loading ports were: Mena al Ahmadi (Kuwait) 120,506 tons, Peurto La Cruz (Venezuela) 45,682 tons, Punta Cardon (Venezuela) 33,085 tons, New Orleans

17,144 tons, Cumarebo (Venezuela) 15,585 tons, Caripito (Venezuela) 15,700 tons, and Cartagena (Colombia) 14,300 tons.

Israel Drilling Planned

A rig and auxiliary drilling equipment is now being prepared in Houston for shipment to Israel where it will be used for the first exploratory test by Pontiac Petroleums, Ltd., on farmout acreage from Israel Continental Oil Co.

The well, projected to 9,000 ft. into the Jurassic, will be on the Caesarea structure 20 miles south of Haifa on the Zevulon concession. Pontiac plans to drill a second test on a structure found on the southern nose of Mount Carmel.

Gravity-meter surveys have been carried out on the concessions in which Pontiac is interested, and reflection seismograph have been used to map the anomalies in the Zevulon block. This work was done on contract by the Israeli Weizmann Institute of Science. In addition, the company has engaged a local Israeli company to drill between three and eight core holes to around 2,600 ft.

The rig to be shipped to Israel is a U15. The company has engaged a crew of 12 to be sent with the equipment. Meanwhile, geological work is under way elsewhere in Israel on other concessions covered by the farmout arrangement.

A total of 800,000 acres is held on the Pontiac farmout from Israel Continental. Pontiac undertakes all geophysical and drilling in return for a 50 per cent consideration. However, Pontiac is reimbursed for all expenses from the first production.

Shell Spending Up

Royal Dutch expenditures in '53 total $616 million

CAPITAL expenditures of the worldwide Royal Dutch-Shell group increased 17 per cent in 1953 over 1952, hitting £220,000,000 ($618,000,000).

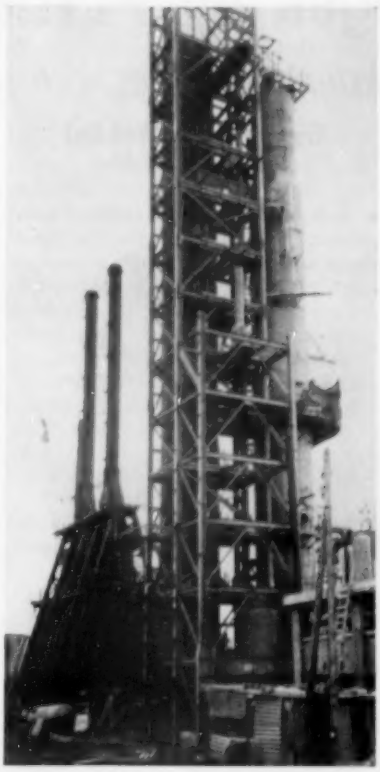
The annual report of Royal Dutch Pethroleum Co. pointed out capital expenditures of the Royal Dutch group has averaged £191,000,000 ($535,000,000) during the last 3 years, and future outlays of this magnitude are anticipated during the coming year.

Of the 1953 spending, 46 per cent went into exploration and production, 33 per cent in manufacturing, 13 per cent in marketing, 6 per cent in ocean-going fleets, and 2 per cent to miscellaneous.

The need for a depletion allowance in the United Kingdom and Netherlands was stressed in the report. Rising cost and competition were cited as reasons for needing an allowance from the two nations. These countries make no tax allowance for an extractive industry for depletion of oil or other mineral reserves.

Because of reduced demand for fuel oil, production of crude and natural gasoline by group companies showed less increase than in previous years. Average output was at a rate of more than 1,300,000 bbl. daily, while total supplies, including crude under long-term contract (mainly with Gulf for Kuwait oil), averaged about 1,690,000 bbl. daily.

Refinery runs of group companies gained only slightly over the previous year. The average was about 1,700,000 bbl., not including some 31,500 bbl. daily blended direct into finished products.



Belgian Cracker Goes Up

This 3,600-bbl. daily Houdriflow catalytic cracking unit is under construction at the Antwerp, Belgium refinery of Albatros S. A. Belge pour le Raffinage de Petrole. The unit is scheduled to be completed by the middle of this year. It was designed and licensed by Houdry Process Corp. with Houdry and Head Wrightson Processes, Ltd., collaborating on engineering and procurement. Work now in progress at the refinery is designed to expand its crude capacity to about 12,000 bbl. daily.

Refinery Planned

International will build new plant in Colombia

INTERNATIONAL PETROLEUM CO., LTD., has decided to construct a new 25,000-bbl. daily refinery near Cartagena on the Caribbean coast of Colombia.

The project has been under study by International for some time. It was recommended by a government-industry commission which reported on Colombia's future oil needs a year ago.

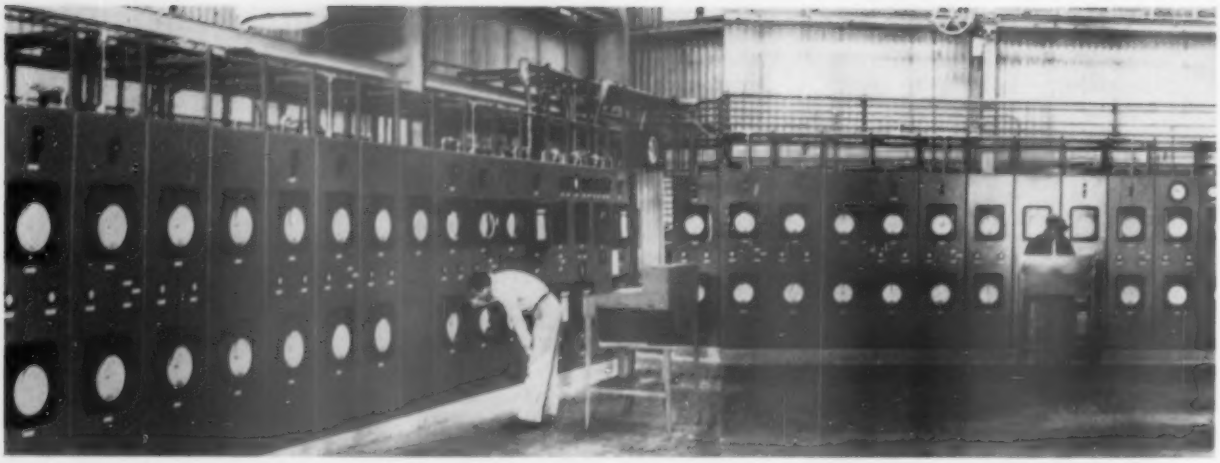
The announcement that the plant would be built was made in Bogota by International officials. The location was named as the Mamonal terminal of the Andian National crude-oil pipeline, which extends from the De Mares fields of Empresa Colombiana de Petroleo and Shell's Casabe field. Texas Petroleum Co. is building a line to tie its Velasquez production into the Andian National system. Andian National and International both are affiliates of Standard Oil Co. (N. J.).

The new Cartagena refinery is to be completed in 1958. Cost will be about $30,000,000. Its production will be used to supply particularly the west coast of Colombia, which is now served by imports from Aruba.

International Briefs

A complete rotary rig has been fabricated in West Germany for the first time by Machinenfabrik Alfred Wirth of Erkelenz. It was ordered by C. Diel-mann Bergbau for European operations and is designed for 10,000 ft. with 4½-in. drill pipe and 13,000 ft. of 3½-in. pipe. Derrick is 135 ft. high, and the crown block is rated at 250 tons. The draw works are powered by two 440-hp., two-cycle engines which also drive the pumps. The rotary table is driven by a 220-hp. engine. The manufacturing company, Wirth, also holds a license from Hughes Tool Co. for the manufacture of drilling bits.

Standard Oil Co. (N. J.) has filed application for an exploration permit under the new Turkish petroleum law. The nonexclusive permits allow the companies to continue preliminary geological work started last year under special government authorization pending the law's passage. Regulations providing full concessions are expected to be issued late this year. Jersey Standard is the fourth company to apply. The other three, Royal Dutch-Shell, Caltex, and Socony-Vacuum, all have marketing interests in Turkey.



Main control panel in the Spencer Chemical Co. plant at Vicksburg, Miss., operates boilers, air separation, and gas generation and purification.

MAKING AMMONIA—2

A First: Hydrogen by Partial Oxidation

Spencer plant at Vicksburg operates with eight operators per shift

by John C. Reidel
Petrochemical Editor

AT its new Vicksburg works, which went on stream in February of this year, Spencer Chemical Co. has installed facilities which employ between 12,000,000 and 15,000,000 cu. ft. per day of natural gas. Of this, some 9,000,000 to 11,000,000 cu. ft. per day goes into the process to make 220 tons of anhydrous ammonia per day. About 25,000,000 cu. ft. per day of air is employed in the process.

Ammonia products facilities include units to manufacture daily 110 tons of nitric acid, 140 tons of ammonia nitrate solution, and 350 tons of ammoniating solution ("Spensol"). Storage facilities have been built to hold 2,700 tons of anhydrous ammonia and 15,000 tons of nitrate solutions.

● **Special features . . .** The new Spencer plant is notable as the first ammonia plant to employ the partial oxidation method for making hydrogen. The plant is outstanding in its compactness, featuring a high degree of process integration and employing instrumentation to a greater degree than has been normal in the past in ammonia plants. This makes it possible to operate at Vicksburg with only eight operators per shift which is about one-third the number required for a plant of the same size designed along conventional lines.

● **Compression . . .** Centrifugal compressors are employed for the lower stages of compression of air and nitrogen. An important consideration in ammonia synthesis is that the synthesis gas be free of oil. Use of centrifugals is advantageous in this respect. Natural gas, air, and nitrogen in higher stages of compression are handled in gas-engine-driven reciprocating units, each unit compressing all three of the gases. Savings have been achieved through use of a smaller number of compressor units with greater concentration of horsepower per unit than has been customary in this application.

Centrifugals employed at the Vicksburg plant include: (1) main air compressor, and (2) nitrogen blower. The main air compressor consists of two centrifugal compressors driven in tandem by one 5,300-r.p.m. steam turbine which handles 19,700 cu. ft. per minute of air. The nitrogen blower consists of one centrifugal compressor driven by one 643-hp., 8,750-r.p.m. steam turbine.

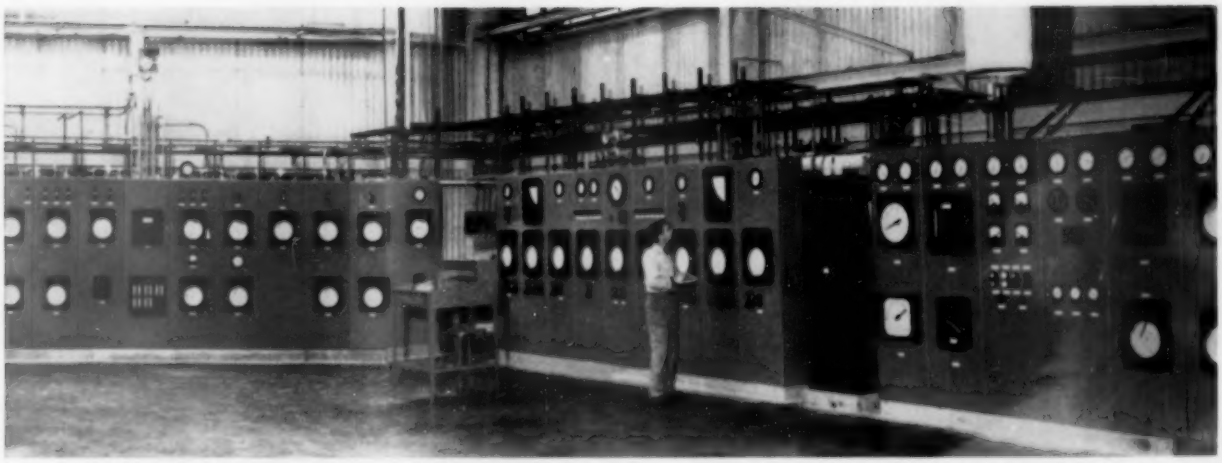
In addition, the nitric acid plant at Vicksburg employs an air compressor consisting of two centrifugals driven in tandem by one 3,834-hp., 7,140-r.p.m. steam turbine. This unit compresses 15,100 cu. ft. per minute of air from zero to approximately 125 psig.

Reciprocating compressors consist of four 2,000-hp. machines, standard model GMW engines. Two of these have two stages, handling synthesis gas in final stages just before the ammonia synthesis step. The other two are three-stage twin machines operating in parallel, eight-cylinder, V-type, designed for these services: (1) natural gas in a single stage, (2) air and nitrogen in two stages each. These gas-engine-driven reciprocating units are equipped with horizontal compressor cylinders arranged in two banks.

Flexibility of the partial oxidation method with regard to both feed and product has been noted previously.[1] For ammonia manufacture this method has the advantages that it contributes toward savings in size of process vessels, as well as some savings in compression.

● **The process . . .** The over-all Vicksburg process scheme may be visualized by reference to Fig. 1. Chief process steps are: (1) Synthesis gas preparation by partial oxidation. (2) Shift conversion. (3) Gas purification which includes liquid nitrogen wash. (4) Addition of more nitrogen from the liquid air plant. (5) Ammonia synthesis.

Spencer's process scheme has been reviewed by Kelley and Cain.[2] Natural gas comes to the plant from the



By using automation so completely, only 110 people are needed to operate the entire Vicksburg plant—from works manager to the last janitor.

United Gas Pipe Line Co. trunk line within the pressure range of 100 to 175 psig. It is compressed and preheated before entering the synthesis gas generation section.

Oxygen generator . . . Air is separated into pure liquid oxygen and pure gaseous nitrogen in the Air Products, Inc., "cold box" units at Spencer's Vicksburg plant.

Spencer furnishes compressed, purified, and dried air to the air-separation plant at a pressure of 600 psig. and approximately 50° F. This passes through the heat exchanger where all of it is partially cooled and divided into two streams. One stream goes to the turbo expander where it is expanded to a pressure of approximately 90 psig. and cooled to approximately liquid air temperature; the other stream continues through the heat exchanger where it is partially liquefied and passes on to the air expansion valve where it is expanded to the same pressure (90 psig. approximately) and joined with the turbo expander exhaust and fed to the high-pressure column.

Preliminary separation of the air into a crude oxygen liquid and a reflux nitrogen liquid takes place in the high-pressure column at approximately 90 psig. The crude oxygen liquid is withdrawn, expanded through a valve to approximately 10 psig., and fed to the low-pressure column at an intermediate point. The reflux nitrogen liquid is withdrawn, also expanded through a valve to the same pressure (10 psig.), and fed to the top of the low-pressure column.

AERIAL VIEW of the Spencer plant shows its outstanding compactness and the high degree of process integration that such broad instrumentation requires.

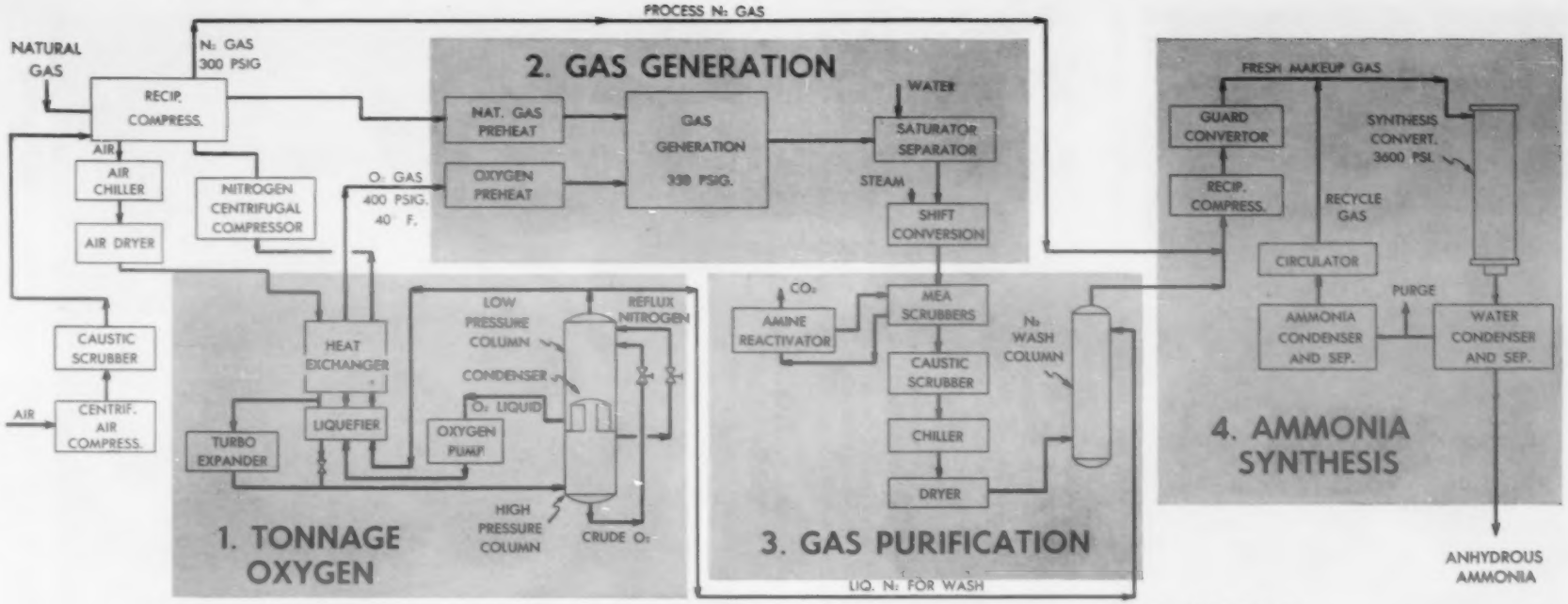
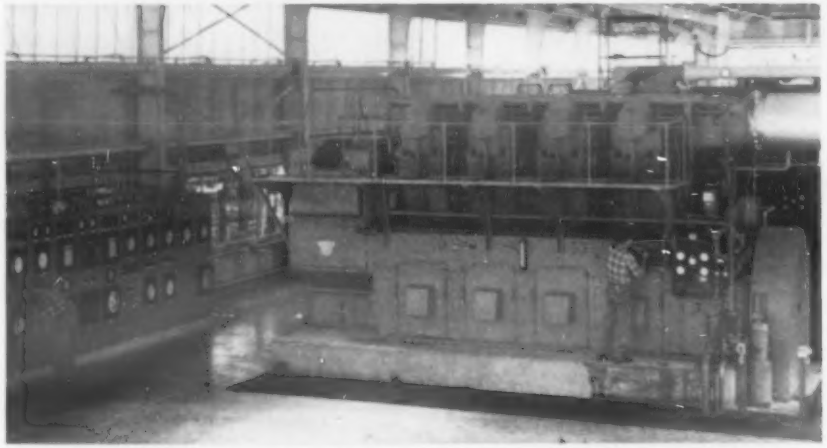
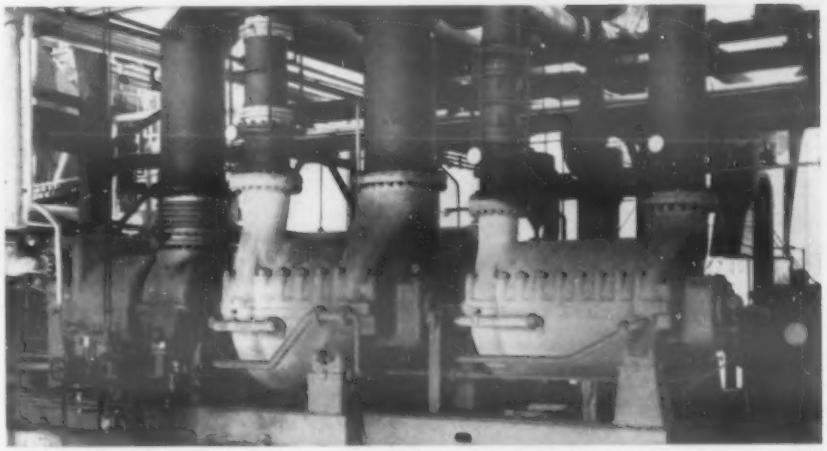


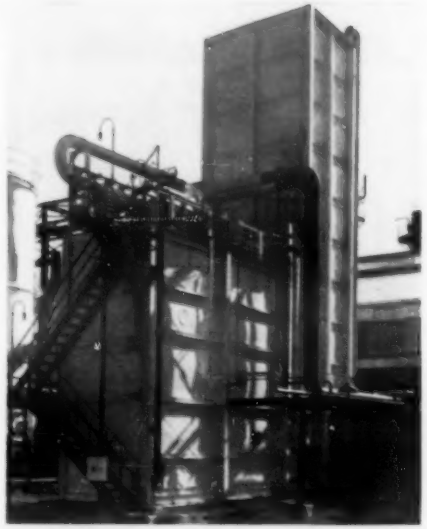
Fig. 1—How natural gas and air are converted to ammonia in process scheme employing partial oxidation at Spencer's Vicksburg plant.



Ammonia synthesis control panel and circulator valves, with one of the four compressors at right.

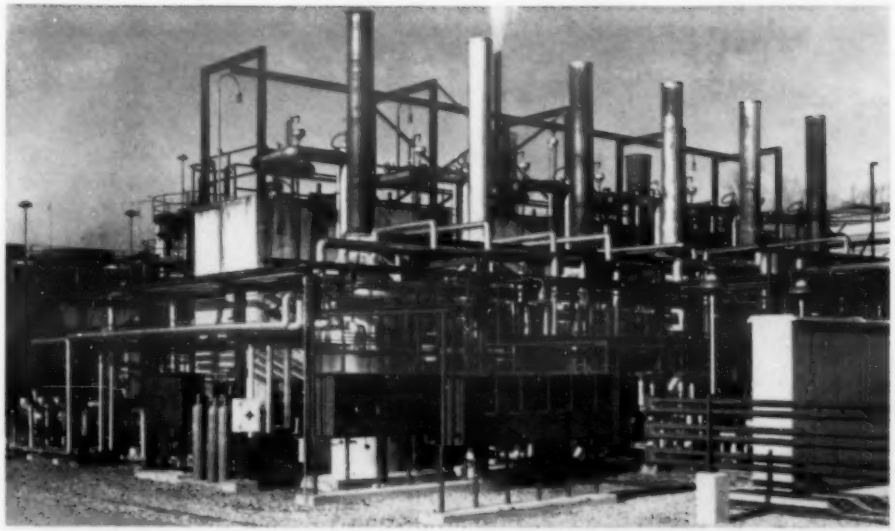


This centrifugal air compressor for the air separation plant raises air pressure from 0 to 125 psig. in two stages.

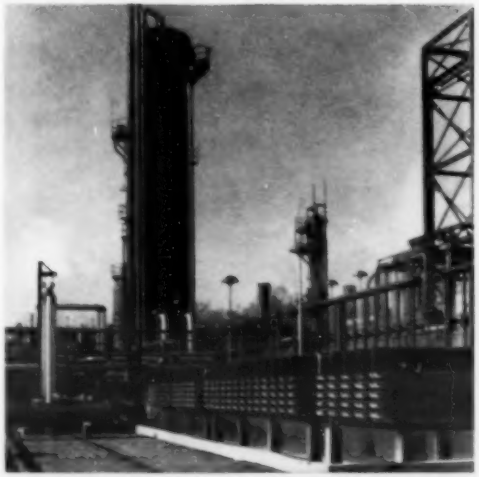


An important part of Spencer's partial oxidation process is this air-separation plant.

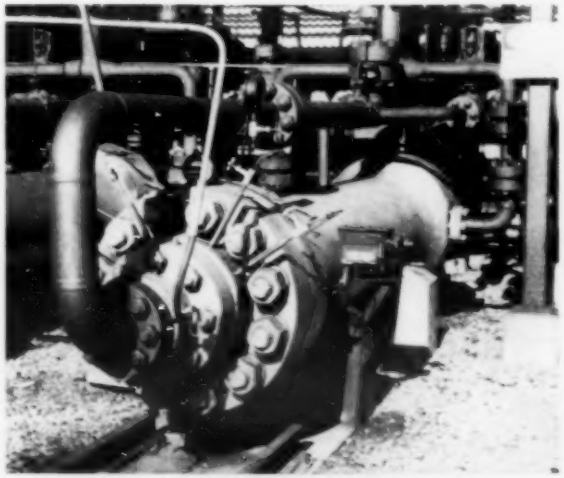
Flow Chart of Process and Picture Tour of the Spencer Plant at Vicksburg



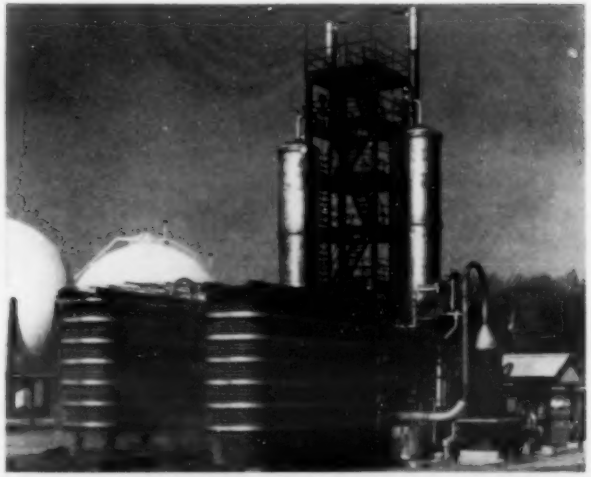
These natural-gas preheaters and hydrogen generators are part of the plant in which natural gas is partially burned with oxygen to form carbon monoxide and hydrogen.



Here's the plant's amine reactivator that uses amine in the purification process to remove carbon dioxide from the hydrogen taken from natural gas.



German engineers designed this ammonia circulator, manufactured in Oberhausen, Germany. It is used to boost pressure in the ammonia synthesis system.



Nitric acid is formed in these units when nitrogen dioxide is passed through water in the absorption towers in the rear. Nitric acid fumes are absorbed, leaving nitric acid of high purity.

Final separation of the air into the two products is accomplished in the low-pressure column at approximately 10 psig. The oxygen product is withdrawn as a liquid and fed to the liquid pump where it is compressed to 400 psig. From the pump it passes through the heat exchanger countercurrent to the air where it is vaporized and warmed to approximately inlet air temperature. The nitrogen product is withdrawn as a gas and also passed countercurrent to air through the exchanger and warmed to approximately inlet air temperature.

In this manner the product oxygen is withdrawn as a gas at 400 psig. and at approximately 40° F. and the product nitrogen as a gas at 1 psig. and approximately 40° F. The 9-psig. pressure drop in the nitrogen stream is taken in the heat exchangers, piping, and valves.

Actually the plant at Vicksburg has eight groups of exchanger units in parallel. The exchangers are constructed of copper tubing and stainless-steel shells. The high-pressure fluids pass through the copper tubes and the low-pressure nitrogen through the shells.

The turbo expander two at Vicksburg, (one as spare) consists of the turbine, gear reducer, and generator. Pressure drop (600 psi. to 90 psi.) and temperature drop (—160° to —275° F.) are converted to kinetic energy to provide refrigeration for the air-separation plant. The turbine, approximately 6 in. in diameter, turns at 25,000 r.p.m. This speed is reduced to 3,600 r.p.m. through the gear reducer to drive the generator. The generator then acts as a "brake" in generating power which is put back into the customers' power system. This expander, designed and built by Air Products, is the first radial inward-flow type to be used at these pressures in conjunction with an air-separation plant. This small wheel of 6-in. diameter, weighing less than 2 lb., makes about 40 million revolutions per day to drive a 2½-ton generator developing 200 hp.

The distillation column is of the double rectification type. The materials used in construction are copper and silicon bronze.

The oxygen pump is a multistage, centrifugal-type pump operating at 3,600 r.p.m. It is constructed of stainless steel and bronze material and is capable of pumping approximately 40 g.p.m. of liquid oxygen to a pressure of 400 psig. A unique feature of this pump is that the pumped liquid oxygen acts as a lubricant. This is the first centrifugal-type pump operating continuously in conjunction with an air-separation plant.

The pump is particularly compact in comparison with oxygen compressors, since the density of liquid oxygen is 850 times that of gaseous oxygen at standard conditions of temperature and pressure.

Instrumentation is in conformance with the other Spencer controls in that a semiautomatic panel is provided, remote from the air separator, and located in Spencer's main control room. A single operator per shift can perform other duties in addition to the operation of the air separator.

The air-separation plant is capable of producing simultaneously 200 tons per day of oxygen at 400 psig. and 95 per cent purity and 350 tons per day of nitrogen at 1 psig. and 99.99 per cent purity. In addition refrigeration is continuously supplied to liquefy a stream of nitrogen which is used in the hydrogen purification system.

● **Gas generation** . . . Oxygen leaving the air separation plant as a gas is preheated. Natural gas is also preheated. Six gas generators are employed, operating at temperatures "in excess of 2,000° F." Oxygen supplied to the reaction will be more than the stoichiometric amount to make carbon monoxide plus hydrogen and under the stoichiometric amount to make carbon dioxide plus water. Precautionary measures are necessary to avoid side reactions. (See following discussion on carbon formation).

Synthesis gas from gas generators may contain about 60 per cent hydrogen. Residual methane is held to several tenths of 1 per cent. Nitrogen content is in the order of 0.75 per cent, resulting in reduced size of gas-generation equipment and compression savings when compared to steam-methane reforming.

Shift conversion . . . The mixture of carbon nonoxide and hydrogen with some CO_2, methane, and water vapor is cooled and saturated with water in the saturator-separator (quench) vessel and carbon particles are scrubbed out. The shift conversion follows next, this being carried out in conventional manner over iron oxide catalyst with over 90 per cent of the carbon monoxide converted to hydrogen and carbon dioxide. The synthesis gas going to ethanolamine scrubbing may contain about 30 per cent CO_2. Steam for the shift reaction is obtained by utilizing heat from the partial oxidation generators. Following shift reaction the steam is used to supply heat for the gas-purification unit.

Gas purification . . . Aqueous ethanolamine solution is used to remove the CO_2 and this is liberated in reactivation of the amine. At Vicksburg

TABLE 1—PARTIAL OXIDATION REACTIONS

Approximate net equation:

$$CH_4 + \tfrac{1}{2}O_2 \rightarrow CO + 2H_2 + \text{Heat} \quad (1)$$

Takes place in two steps:

Step 1

$$CH_4 + 2O_2 \rightleftharpoons CO_2 + 2H_2O + \text{Heat} \quad (2)$$

Step 2

$$CH_4 + CO_2 \rightarrow 2CO + 2H_2 - \text{Heat} \quad (3)$$

$$CH_4 + H_2O \rightarrow CO + 3H_2 - \text{Heat} \quad (4)$$

One of the equilibrium equations which forms carbon:

$$2CO \rightleftharpoons CO_2 + C + \text{Heat} \quad (5)$$

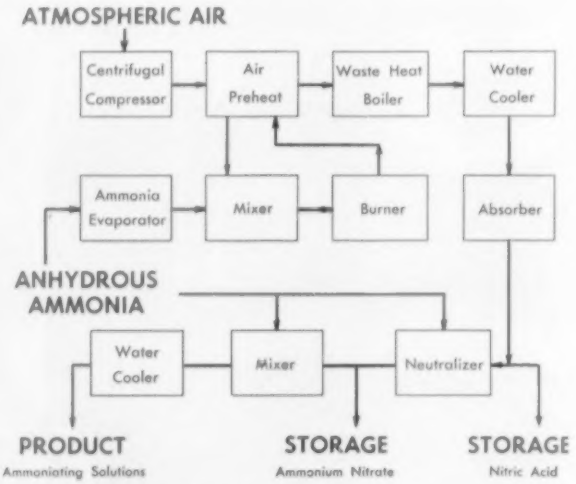


Fig. 2—Schematic flow plan for manufacture of ammonia products.

the carbon dioxide is vented. Alternatively, it could go to dry-ice manufacture or to urea manufacture. Following caustic scrub to take out any CO_2 carried over, the gas is chilled and passed through activated alumina dryers to prevent icing in the nitrogen wash step. Traces of methane, carbon monoxide, and argon are removed in this step. Nitrogen vaporized in scrubbing out last traces of impurities therefore enters the synthesis gas stream at this point and final adjustment to obtain the proper mole ratio is by addition of pure nitrogen gas as shown. Liquid nitrogen from the bottom of the wash tower, carrying the impurities removed from the synthesis gas, is cold exchanged with refrigeration recovered, and the gaseous nitrogen vented.

The hydrogen-nitrogen stream enters the ammonia synthesis loop and goes through the reactor. Ammonia formed at 3,600 psig. is cooled and condensed with unreacted gases recycled through the reactor.

Spencer's choice of the relatively low pressure of 3,600 psig. for ammonia synthesis is based in part on the high purity of the synthesis gas obtained by nitrogen wash. This makes possible about the same conversion at 3,600 psig. that was formerly possible at 5,000 psig. Removal of methane and argon by the nitrogen wash also saves on compression cost with reduction in purging of the synthesis loop.

Partial oxidation . . . This method was part of the design for the McCarthy Chemical Co. plant at Winnie, Tex., and was employed at the Carthage Hydrocol plant in Brownsville, now in process of being reactivated. It has been in pilot-plant operation for some time at the Texaco Development Co., Montebello, Calif., laboratory. The development is covered by patents.[3,4]

Partial oxidation reaction . . . Equilibrium studies of the partial oxidation reactions have been made by Montgomery and Weinberger[5] and Mayland and Hayes.[6]

As part of the work done by Stanolind Oil & Gas Co. at its Tulsa laboratory in connection with preparation of synthesis gas for Fischer-Tropsch reactions, Mungen and Kratzer[7] concluded that the approximate over-all or net equation can be given as Equation 1 in Table 1.

Since Equation 1 is an exothermic equation, increase in temperature should result in decrease in conversion. But Mungen and Kratzer noted that equilibrium conversions of methane increase with temperature. Partial oxidation of methane with oxygen is therefore apparently a multireaction process.

First, Reaction 2 takes place, this being a strong exothermic reaction. This reaction represents reaction of practically all the oxygen supplied with part of the methane. The CO_2 and water produced then react with the remaining methane in endothermic Reactions 3 and 4, shown in Table 1.

An explanation is therefore found for the increase in equilibrium conversion of methane with increasing temperature in that Reactions 3 and 4 of Table 1 are both endothermic and are the rate determining equations as well.

Temperature . . . As noted by Kelley and Cain[2], what these equations point up to is that more than the theoretical oxygen must be used to attain a temperature in excess of 2,000° F., this being necessary if synthesis gas is to be made by the noncatalytic partial oxidation. Since extreme reactivity of oxygen and possibility of thermal cracking of the methane prevent preheating of either stream to the high temperatures required, use of excess oxygen is indicated.

Pressure . . . Methane is reacted virtually completely at the high temperatures employed, even at moderate pressure. The use of higher pressure then is based on savings in equipment cost and in compression. Equipment costs are brought down and a more compact plant results when employing higher pressure. Advantage may be taken of the initial pressure at which the natural gas is supplied. Lesser compression costs also result in compression of the reactants (smaller volume) rather than the product hydrogen (larger volume).

Making carbon . . . Formation of carbon is one of the very important factors affecting operability of the partial oxidation process. In this connection note one of the reactor equilibrium Equations 5 in Table 1. Partial pressure of CO_2 is such that the equilibrium constant is exceeded. Also, since the reaction is exothermic, meaning that an increase in temperature decreases the value of the equilibrium constant, carbon formation can be kept at a minimum by proper oxygen-to-methane ratio in the feed going to the partial oxidation retort.

● **Other processing . . .** Ammonia products processing at Spencer's Vicksburg plant (see block-flow diagram, Fig. 2) includes:

1. **Nitric acid**—Ammonia is evaporated and preheated. Air, handled by a centrifugal compressor, is mixed with ammonia, the latter amounting to about 10 per cent of the mixture. The mixture is burned on a platinum catalyst to make nitrogen dioxide. Equipment includes a waste heat boiler and nitric oxides absorption tower operating under pressure. Nitrogen leaves the top of the absorber and 57 per cent nitric acid is obtained.

2. **Ammonium nitrate.**—Ammonia is reacted as a liquid with the 57 per cent nitric acid in a stainless-steel vessel. Reaction is exothermic, evaporating off the water formed. An 84 per cent (neutral) ammonium nitrate solution is formed.

3. **Ammoniating solutions.** — Anhydrous ammonia, 84 per cent ammonium nitrate, and water are combined in a mixer designed by Spencer. Mixture is cooled to remove heat formed and collected in final blend tanks mounted on scales.

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1. The Oil and Gas Journal, February 8, 1954, page 60.

2. Kelley, J. C., and Cain, J. H., paper presented at A.C.S. symposium on petrochemicals, Chicago, September 1953.

3. Eastman and Gaugher, U.S.P. 2582938 (Jan. 15, 1952).

4. Riblett, U.S.P. 2491518 (Dec. 20, 1949).

5. Montgomery, C. W., Weinberger, E. B., and Hoffman, D. S., Ind. Eng. Chem. 40, 601-7 (1948).

6. Mayland, B. J., and Hayes, G. E., Chem. Eng. Progress, 45, 452 (1949).

7. Mungen, R., and Kratzer, M. B., Ind. Eng. Chem. 43, 2782-7 (1951).

8. "Heat Engineering" Foster-Wheeler Corp.), January-February, 1954, page 6.

9. Bliss, H., and Dodge, B. F., "Oxygen Plants," Chem. Engr. Progress, 45, 51 (1949).

10. Bliss, H., and Dodge, B. F., "Oxygen Plants . . . ", ibid. 45, 129 (1949).

11. Chemical Engineering, March 1947, page 126.

12. Arnold, J. H., "Instrumentation of Oxygen Plants," Texas A. & M. Process Instrumentation Symposium, 1951.

Construction. — Quaker Valley Constructors. Foster-Wheeler, contractor on special portions of plant.

Partial oxidation units.—Texaco Development Co., design; process licensed from Texaco Development Co. and Hydrocarbon Research, Inc.; burners manufactured by John Zink Co.

Air-separation plant.—Air Products, Inc.

Centrifugal compressors. — Clark Bros., Inc.

Reciprocating compressors.—Cooper-Bessemer Co.

Instruments. — Foxboro Co.; Baird analyzers.

Submarine pipeline operations seen from the Jersey shore looking toward the Philadelphia area. The 4 by 14-ft. pontoon tanks are being cinched down at low tide to get needed lift on the pipeline as the tide rises.

Two Lines in a Single River Trench

8 and 12-in. products lines cross the Delaware side by side

by Jim Crawford

TWO 5,800-ft. products lines were laid simultaneously 3 ft. apart in the same trench in the Delaware River between Philadelphia and New Jersey.

The two lines will feed into the Harbor Products Systems project now under construction. The main line for Harbor will consist of 81 miles of 16-in. from the Philadelphia area to Linden, N. J. This project is owned by Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.

The two submarine lines completed in February include an 8-in. of Sinclair Pipe Line Co. and a 12-in. diameter line of Gulf Oil Corp. Both lines are of ½-in. wall thickness, coated with ⅝ in. of Somastic and 1¾ in. of Hevicote concrete.

The construction of this water crossing has been under the direction of L. B. Moon, vice president, Sinclair Pipe Line Co. The prime contractor was Missouri Valley Dredging Co. Subcontractors include American Dredging Co., Acme Pipelines Construction Co., and Gates Brothers Marine Service. Somastic and Hevicote concrete coating were applied to 40-ft. random-length joints at H. C. Price Co.'s Bustleton, Pa., yard.

Author is eastern manager, Missouri Valley Dredging Co., South Orange, N. J.

Principal features . . . The principal features of the submarine operations were: (1) a 3,000-ft. launching track built on the New Jersey shore, (2) dollies at 80-ft. intervals, (3) spacers to keep the lines 3 ft. apart, (4) a special pulling head for holding the front ends of the lines during pulling, and (5) pontoons to provide sufficient buoyancy during pulling. After the towing line broke during pulling, it was necessary to provide more buoyancy by pontoons attached by a diver in the water and by additional pontoons fastened to the pipe on the launching track.

Dredging . . . The trench was dredged by American Dredging Co. in approximately 90 days and required removal of 650,000 cu. yd. of material. Beginning on the New Jersey shore and outward 2,000 ft. were mud flats with a plus elevation at mean low water. Grade established for top of pipe over this area was minus 18 ft. m.l.w.

Next was a 600-ft. proposed extension to the anchorage with a minus 2-ft. elevation at m.l.w. Grade for top of pipe over this area was minus 18 ft. to minus 60 ft. m.l.w. The existing anchorage was 1,400 ft. and the channel 800 ft. in length. Grade for top of pipe in these areas was minus 60 ft. m.l.w. Bottom depth of river through these two sections was minus 40 ft. m.l.w. Depth at the Pierhead line on the Pennsylvania shore for top of pipe was minus 50 ft. m.l.w.

American Dredging used three dredges in completion of the trench. The hydraulic dredge Pennsylvania with 27-in. suction dug the mud flats and down the slope into the anchorage area to a depth of minus 58 m.l.w. The anchorage, channel, and slope on the Pennsylvania side were dredged by the bucket dredges Commodore and Camden.

Welding and site preparation . . . The New Jersey side was selected for preparation of pipe. Welding of the pipe and coating of field joints were done by Acme Pipelines Construction Co. Each line was welded in two sections of approximately 2,900-ft. length. All welds were X-rayed. The sections were pigged and a hydrostatic test of 1,200 psi. was made.

A 3,000-ft. railroad track was laid

for launching both pipelines simultaneously. The dollies were spaced at 80-ft. intervals. One steel plate was welded to the bed of the dolly and a second steel plate was slotted and bolted on top. The area between these plates was greased to allow for side motion of the pipes during the launching operations. Due to the differences in weight of the 8 and 12-in. pipes they were placed off-center on the dollies.

The requirements were for a 3-ft. spacing between pipe lines in the trench. Special pipe sleeves were fabricated and clamped every 80 ft. Spacers made of 6-in. channel were installed over the pipe sleeves using No. 9 wire. A ¾-in. cable was placed the entire length of each line through the wire and a small piece of cable was clipped between the spacer and the ¾-in. cable in order to remove the spacer after launching.

Pontoons with a net lift of 1,600 lb. were placed between the pipe lines. A negative buoyancy of 61 lb. was obtained over the first 2,000 ft. of pipe line. The remainder of the line was lightened to an average 15 to 20 lb. negative. Pontoons were held in place by No. 9 wire and the same ¾-in. cable mentioned above was used to break the wire and release the pontoons.

Pulling operations . . . Three winches were set up on the Pennsylvania side to pull the pipes. Two of these winches were rated at 50 tons and the other 80 tons drawbar pull. The winches were set approximately 650 ft. back from the shore. The 4-ft. diameter logs used for deadmen were buried 15 ft. in the ground.

The pulling head was fabricated from 8 and 12-in. pipe and crossbracing and heavy steel plate. To this head a 1¾-in. cable was attached. The pulling cable was socketed in 600-ft. lengths from the winch. A double-draw winch was mounted on two steel barges 26 by 8 by 4 ft. and attached to the pulling head to keep the nose of the pipe up during the pull.

After 2,000 ft. of the pipelines had been pulled over the mud flats, the nose was lowered to go down the slope into deep water. The nose buried in the mud and the pull cable broke. Before another pull was made, this 2,000 ft. of line was pontooned using two 4 by 14-ft. tanks spaced every 200 ft. over the lines. A diver was used to place the pontoon cables around the pipes. The cables were cinched down at low tide and the high tide supplied the lift. Additional pontoons were placed in the sections of pipe on shore. Two more pull cables using 1¼ and 1½-in. cable were run from the pulling head to the winches for safety. A winch with lift capacity of 80 tons was substituted for the double-drum winch on the nose of the pipes.

The pull was then resumed and as the 4 by 14-ft. tanks approached the deep water, the cable clips were loosened, and the cable rendered or run through the clips. As the pull was stopped to remove a 600-ft. section of cable, these tanks were removed from the lines.

When the pipe lines were completely across the river, two winch units were mounted on steel barges and set out across the river breaking the No. 9 wire and releasing the pontoons and pipe spacers. At each 80-ft. interval the winches were stopped while the spacers were removed from the tripping cable.

Backfilling . . . A minimum 15 ft. of

(Continued on page 98)

Launching track with dollies supporting two pipelines with pontoons, held apart by spacers.

Pipelines passing over rubber-tired launching dollies. Trip cables (¾-in.) run along the top sides of each pipe for breaking No. 9 wire to release pontoons after pipe laying.

Pulling head showing pull cable and auxiliary cable. The two pipelines, launching track, and pontoons are in the background. Pipelines are spaced off-center on the dolly to compensate for difference in weight.

Figure Your Chances Before Fracturing

Here is how to use the skin method in forecasting results

by E. H. Timmerman

PART 2 OF SYMPOSIUM

This article and the accompanying one by R. C. Clark are part of a hydraulic-fracturing symposium conducted by the Mid-Continent District of the A.I.M.E. at Ponca City, Okla., December 14, 1953. The articles by Shupp and Fast in the Journal of May 31, 1954, comprise the remainder of this group of papers.

RESULTS of fracture treatments may be forecast prior to undertaking field operations by methods such as:

- **Analogy.** In some localities formation fracturing is generally applicable and there are many reports of substantial increases in rate of oil production for as much as 85 per cent of jobs reviewed. By analogy, similar success might reasonably be expected when fracturing other comparable wells in such areas.
- **Empirical equations.** Studies of flow and reservoir characteristics of a number of wells within a locality might associate certain factors with successful operations and other characteristics with unsuccessful jobs. Empirical relations then may be devised to express these findings.
- **Mathematical equations.** Mathematical relations based on theoretical considerations of fluid flow also may be used, and this article will present the bottom-hole-pressure-buildup method for predicting success of fracturing.

The following equations may be used to forecast the results of fracture treatments for different types of fluid flow, making conventional assumptions.

Incompressible flow:

$$p(r_b) - p_f = \frac{q\mu}{2\pi kh}\,[\ln(r_b/r_w) + S] \quad (1)$$

and productivity index:

$$\text{P.I.} = [q/p(r_b) - p_f]$$

$$= (2\pi kh)/\mu\,[\ln(r_b/r_w) + S]$$

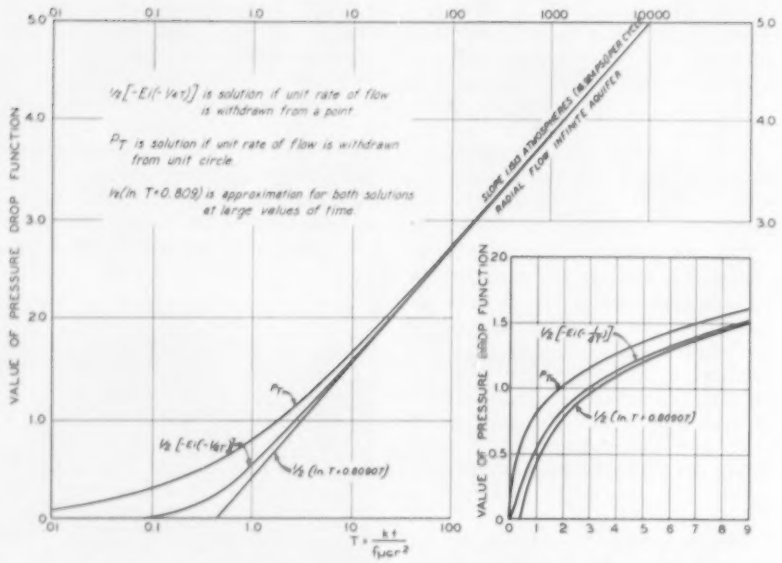
VALUE OF PRESSURE DROP FUNCTION
½[-Ei(-1/4T)] is solution if unit rate of flow is withdrawn from a point
P_T is solution if unit rate of flow is withdrawn from unit circle
½(ln T+0.809) is approximation for both solutions at large values of time
SLOPE 180 ATMOSPHERES/CYCLE
RADIAL FLOW INFINITE AQUIFER
$T = \frac{kt}{f\mu c r^2}$

Fig. 1—Relation between P_T and point source solutions of diffusivity equations.

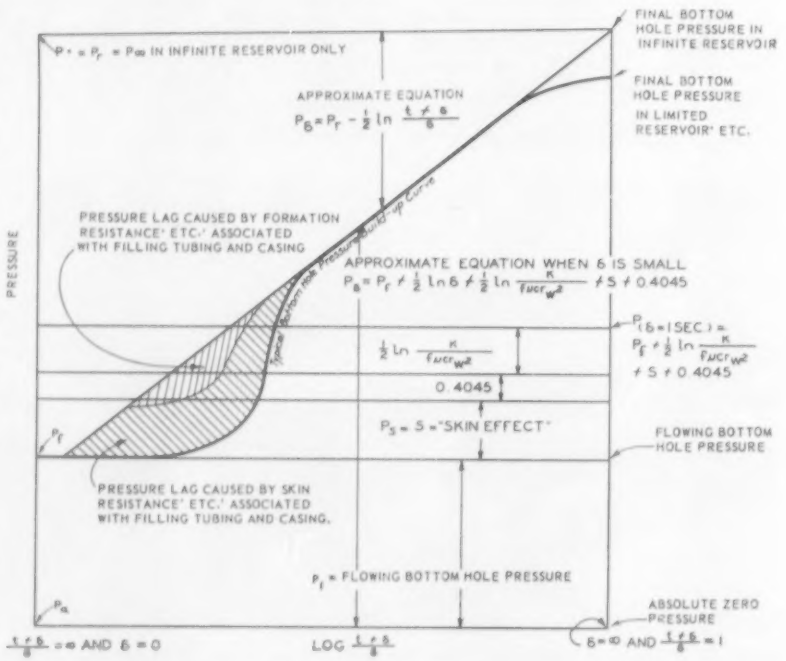
$P_i = P_r = P_\infty$ IN INFINITE RESERVOIR ONLY
FINAL BOTTOM HOLE PRESSURE IN INFINITE RESERVOIR
APPROXIMATE EQUATION
$P_{\Delta t} = P_r - \frac{1}{2}\ln\frac{t+\Delta t}{\Delta t}$
FINAL BOTTOM HOLE PRESSURE IN LIMITED RESERVOIR' ETC.
PRESSURE LAG CAUSED BY FORMATION RESISTANCE' ETC.' ASSOCIATED WITH FILLING TUBING AND CASING
Typical Bottom Hole Pressure Build-up Curve
APPROXIMATE EQUATION WHEN Δt IS SMALL
$P_{\Delta t} = P_i + \frac{1}{2}\ln\Delta t + \frac{1}{2}\ln\frac{k}{f\mu c r_w^2} + S + 0.4045$
PRESSURE
$\frac{1}{2}\ln\frac{k}{f\mu c r_w^2}$
0.4045
$P_S = S$ = "SKIN EFFECT"
FLOWING BOTTOM HOLE PRESSURE
PRESSURE LAG CAUSED BY SKIN RESISTANCE' ETC.' ASSOCIATED WITH FILLING TUBING AND CASING.
P_f = FLOWING BOTTOM HOLE PRESSURE
ABSOLUTE ZERO PRESSURE
$\frac{t+\Delta t}{\Delta t} = \infty$ AND $\Delta t = 0$
LOG $\frac{t+\Delta t}{\Delta t}$
$\Delta t = \infty$ AND $\frac{t+\Delta t}{\Delta t} = 1$

Fig. 2—Schematic interpretation of buildup curve for well which flowed at unit rate before shut in.

Compressible flow:

Steady state:

$$p(r_b) - p_f = \frac{q\mu}{2\pi kh} [\ln (r_b/r_w) - \tfrac{1}{2} + S] \quad (2)$$

Pressure drop at well bore for large values of time in infinite reservoir:

$$p - p_f = \frac{q\mu}{4\pi kh} \times [\ln (kt)/(f\mu cr_w^2) + 0.809 + 2S] \quad (3)$$

Pressure buildup in a well after closing in:

$$p\delta = p_f + \frac{q\mu}{4\pi kh} \times [\ln \delta + \ln (k)/(f\mu cr_w^2) + 2S + 0.809] \quad (4)$$

and if past performance is considered:

$$p\delta = p_r - \frac{q\mu}{4\pi kh} \ln \frac{t+\delta}{\delta} \quad (5)$$

Symbols employed in equations:

- t = production time in standard units which may be approximated by Q/q
- T = production time in reduced units, $T = (kt)/(f\mu cr^2)$
- δ = time that well has been shut in
- k = permeability
- f = porosity
- μ = viscosity of reservoir fluids
- c = compressibility of the reservoir fluids
- r_w = effective radius of well
- r_b = effective drainage radius of well
- q = rate of fluid flow in well—should be constant for week or more prior to shutting in well

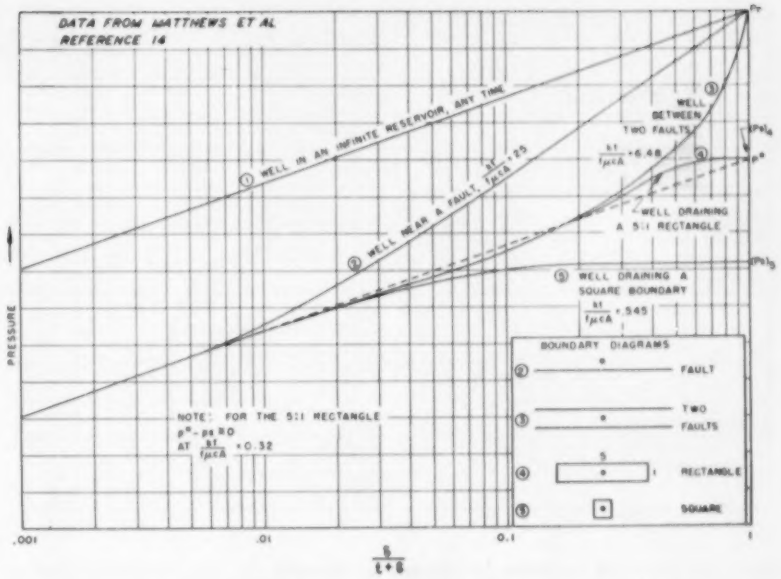
DATA FROM MATTHEWS ET AL
REFERENCE 14
① WELL IN AN INFINITE RESERVOIR, ANY TIME
② WELL NEAR A FAULT, $\frac{kt}{f\mu cA}$ = .25
③ WELL BETWEEN TWO FAULTS, $\frac{kt}{f\mu cA}$ = 6.48
④ WELL DRAINING A 5:1 RECTANGLE
⑤ WELL DRAINING A SQUARE BOUNDARY, $\frac{kt}{f\mu cA}$ = .545
NOTE: FOR THE 5:1 RECTANGLE $p^* - p_{s\,RO}$ AT $\frac{kt}{f\mu cA}$ = 0.32
BOUNDARY DIAGRAMS
② FAULT
③ TWO FAULTS
④ 5 : 1 RECTANGLE
⑤ SQUARE
PRESSURE
.001
.01
0.1
1
$\frac{\delta}{t+\delta}$

Fig. 3—Illustrative pressure-buildup curves showing the influence of a limited drainage area.

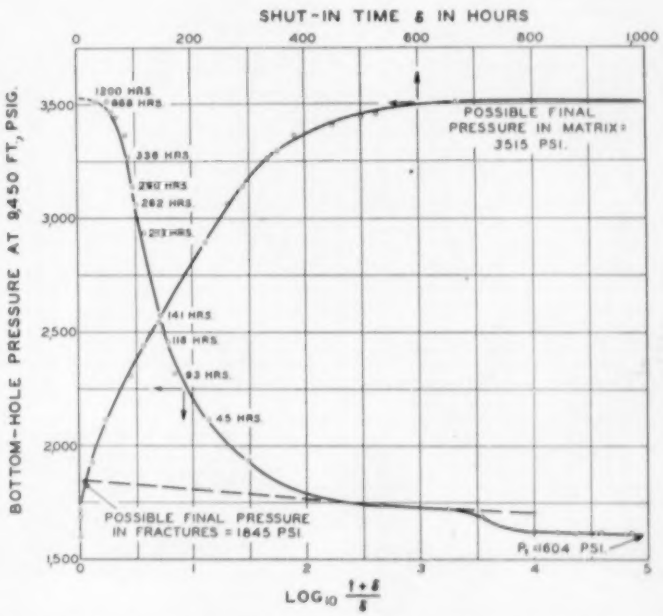

Fig. 4—For wells completed in a highly fractured, thick matrix, these curves are probably typical.

- Q = cumulative production of well
- h = sand thickness
- $q_r = q\mu/(2\pi kh)$ = rate of fluid flow in reduced units
- p = pressure
- $p\delta$ = reservoir pressure in well at any time δ after shut in
- p_r = pressure prevailing in infinite reservoir at location of well
- p^* = pressure obtained by extrapolating straight line buildup curve to infinite shut-in time when $\ln (t + \delta)/\delta = 0$ or $\ln \delta/(t + \delta) = 0$
- p_f = flowing bottom-hole pressure in the well at time well is shut in
- $p(r_b)$ = reservoir pressure at drainage radius of well
- p^* = reservoir pressure reached in well at infinite shut-in time
- S = skin effect = a dimensionless term denoting the detrimental effect of well completion, etc., on well capacity

Note: These symbols are in the C.G.S. system of units associated with

THE AUTHOR

E. H. Timmerman is executive assistant to the vice president, Shell Oil Co., Tulsa. He received a B.S. degree in chemical engineering in 1936 and an M.S. degree in 1937 from University of Texas. Timmerman joined Shell immediately thereafter and has held various reservoir and evaluations-engineering positions with the company.

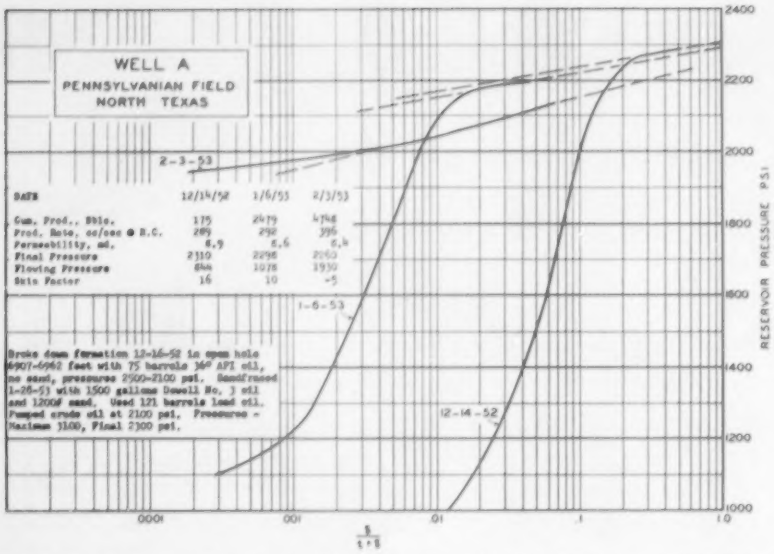
WELL A
PENNSYLVANIAN FIELD
NORTH TEXAS
2-3-53
1-6-53
12-14-52
DATE 12/14/52 1/6/53 2/3/53
Cum. Prod., Bbls. 175 2479 4748
Prod. Rate, cc/sec @ B.C. 289 292 396
Permeability, md. 8.9 8.6 8.4
Final Pressure 2310 2298 2260
Flowing Pressure 844 1078 1930
Skin Factor 16 10 -5
Broke down formation 12-16-52 in open hole 6907-6962 feet with 75 barrels 36° API oil, no sand, pressures 2500-2100 psi. Sandfraced 1-26-53 with 1500 gallons Dowell No. 3 oil and 12000# sand. Used 171 barrels load oil. Pumped crude oil at 2100 psi. Pressures - Maximum 3100, Final 2300 psi.
RESERVOIR PRESSURE PSI
2400
2200
2000
1800
1600
1400
1200
1000
.0001
.001
.01
.1
1.0
δ / t+δ

Fig. 5—An illustrative calculation for this well on December 14, 1952, is shown in Table 1.

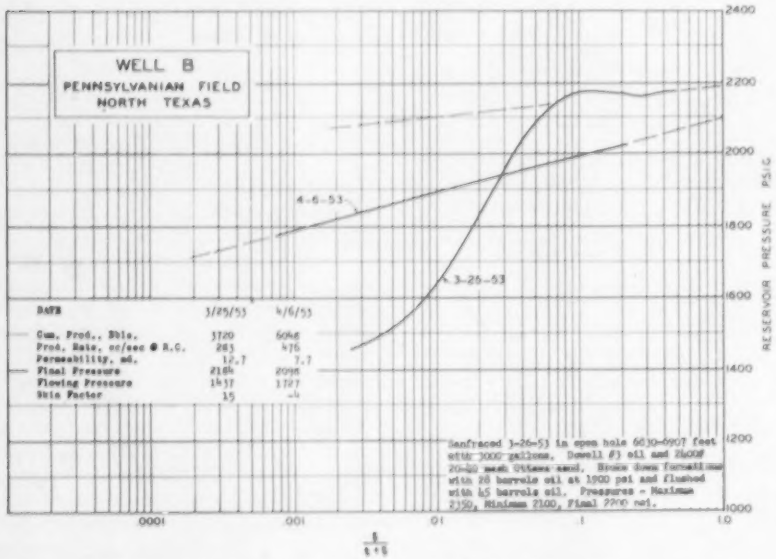

Fig. 6—The characteristic shape of the buildup curve for March 25, 1953, shows a substantial "skin."

Darcy's law; suitable conversion must be made when using other systems.

Increasing productivity . . . Equations 1 to 4 suggest that fracturing operations can increase productivity per unit of pressure drop by reducing the skin effect, increasing the effective well radius, and less frequently by changing k as a result of fracturing into additional permeable channels, i.e., vugs or streaks of high permeability which previously were unexposed and by increasing h as a result of fracturing through barriers such as shale stringers.

Equations 1 and 2 can be useful if the effective μ/kh can be determined from laboratory, core and log information, and the proper drainage area of the well and drainage radius pressure can be determined. However, reliable evaluation of these terms may be difficult and the application of these equations in well-performance forecasts is limited.

Equations 4 and 5 may be used to determine (1) the final buildup pressure of the well, i.e., an approximation of the pressure which would exist at the location if the well had never been produced, (2) an approximation of the value of μ/kh, and (3) the value of the skin factor, i.e., an approximation of the combined detrimental effect

of completion and production practices.

Compressible flow . . . Fig. 1 shows the interrelationship between two solutions of the compressible fluid flow (diffusivity) equation. Both solutions become identical and may be approximated by $\frac{1}{2}$ ln T + 0.809 at large values of $T = (kt)/(f\mu cr^2)$. Thus the natural logarithm function may be used in most pressure-buildup work since the well radius r is small and T becomes large at rather small values of the shut-in time. In contrast, the P_T functions should be used in calculations involving an entire oil reservoir.

The relationship between Equations 4 and 5 can be seen from Fig. 2. Equation 4 uses the atmospheric pressure as a base whereas the prevailing pressure of an infinite reservoir is used as the base in Equation 5. In most field work the straight line occurs when δ is small relative to t and the slope of the early portion of the straight-line part of the buildup curve can be approximated from a plat of the pressure versus the ln δ as well as the ln $(\delta)/(t + \delta)$.

Slight compressibility . . . The pressure-buildup equations assume horizontal flow of slightly compressible fluids in a homogeneous medium of infinite extent. However, the method has been applied successfully to fluids of relatively uniform compressibility such as gas wells. Theory has been presented or is being formulated for various types of limited reservoirs as well as sands composed of two or more layers having widely different permeability.

Fortunately, the straight-line portion and skin effect do not seem to be influenced severely by these parameters providing adequate allowance is made in determining the position of the straight line portion of the buildup curve. The final buildup pressure is more heavily affected as shown by Figs. 3 and 4. Fig. 3 is presented to illustrate the influence of a limited drainage area in reservoirs having prescribed shape characteristics.

Fig. 4 presents a curve believed typical for wells completed in a highly fractured thick matrix which may be considered as an extreme example of the multilayer problem. Similar curves have also been observed in reservoirs producing from several sand stringers of different permeability separated by substantial shale members.

Open-hole completions . . . Figs. 5, 6, and 7 present buildup curves for three wells completed in open hole in a com-

TABLE 1

		Source of data (equations in field units)
Date of test—	12-14-52	
Q = Cumulative production, bbl.	175	Field data
q = Rate of production, bbl. per hour	5.08	Field data
t = Pseudo production time, hours	34.45	$t = Q/q$
Slope of buildup curve, psig. per log cycle	71	Buildup curve
q_r = Unit rate of production	4.2	Slope/16.924
μ = Viscosity, cp.	1.0	Laboratory analysis
C = Shrinkage factor	0.78	Laboratory analysis
h = Sand thickness, ft.	40	Core or log data
k = Permeability, md.	8.9	$k = 230.7\ (q\mu)/(q_r\ Ch)$
p = Final buildup pressure, psi.	2,310	Buildup curve
p_f = Flowing bottom-hole pressure, psi.	844	Pressure survey
p_a, psi.	2,162	Buildup curve
$(p_a - p_f)/(\frac{1}{2}\ q_r)$	42.7	$(p_a - p_f)/(7.35\ q_r)$
δ when $[(\delta)/(t+\delta) = 0.01]$, hours	0.348	$\delta = 0.0101t$
ln 3,600	8.2	ln tables
ln δ	—1.1	ln tables
c = Fluid compressibility, vol./vol./psi.	0.0000102	Laboratory analysis
r_w = Radius of drilled hole, in.	4.0	Field data
f = Porosity, fraction	0.16	Core analysis
$(k)/(f\mu\ cr_w^2)$	3.58	$0.0000105\ (k)/(f\mu\ cr_w^2)$
ln $(k)/(f\mu\ cr_w^2)$	1.3	ln tables
$2S$	*33.5	

*Equation employed: $2S = (p_a - p_f)/(\frac{1}{2}\ q_r) - \ln\delta - \ln (k)/(f\mu\ cr_w^2) - 9.0$.
p_a is for the case $(\delta)/(t+\delta) = 0.01$.

mon reservoir. An illustrative calculation is presented as Table 1 for the curve dated December 14, 1952, of Fig. 5 and results of similar calculations for all curves together with the fracturing treatment employed on each well are presented as part of the respective figures. The producing formation has a porosity of 16 per cent and an average core permeability of about 15 md. All calculations using the slope of the pressure-buildup curve plotted on enlarged scales give results in substantial agreement with this value for the permeability.

Calculations based on buildup curves prior to fracture treatment indicate the presence of substantial "skins." Calculations based on pressure-buildup surveys taken after fracturing operations were performed indicate negative skins. These results may be interpreted to indicate that the skins were substantially removed and that the effective well radius was enlarged during the fracturing process.

Depends on skin effect . . . The pressure buildup per unit rate of flow, $(p\delta - p_f)/[(q\mu)/(2\pi kh)]$ when δ = one second and $\ln\delta = 0$, varies directly as the skin and as $\frac{1}{2}\ln (k)/(f\mu\ cr_w^2)$. Thus removal of large effective skins can be expected to result in relatively large increases in productive capacity. Increasing r also would be expected to increase capacity providing horizontal flow considerations remain applicable.

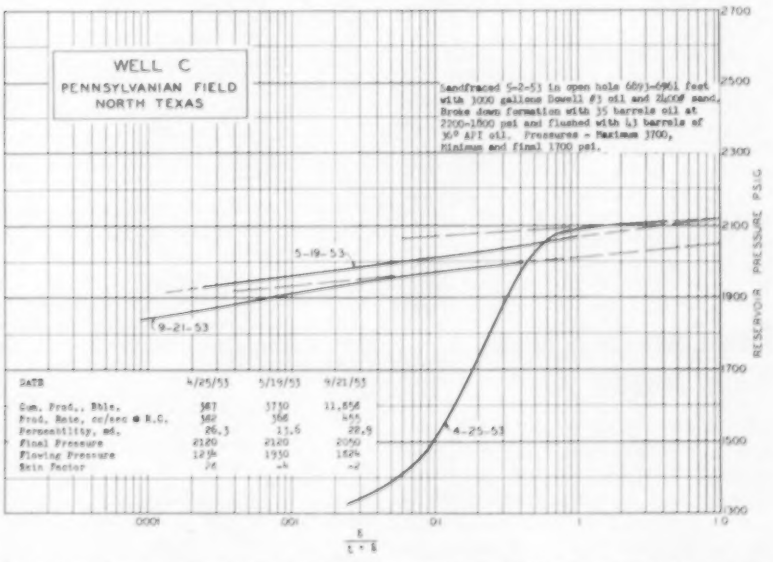

Fig. 7—Fracturing apparently has in this well removed the "skin" and enlarged the effective well radius.

For conditions depicted on Figs. 5-7, increasing r from 0.33 ft. to 33 ft. changes the value of $\frac{1}{2}\ln (k)/(f\mu\ cr^2)$ from 0.6 to —4.0.

These values should be compared with a reduction from 15 (Fig. 6) or 28 (Fig. 7) to —2.0 (Fig. 7) or —5.0 (Fig. 5) in the term $[\frac{1}{2}\ln (k)/(f\mu\ cr^2) + S]$, and it is probable that these fracture treatments were successful largely because the skins or detrimental results of completion practices have in effect been removed.

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Some Practical Aspects of The Fracturing Process

by Roscoe C. Clark, Jr.

OPTIMUM sand concentration in fracturing oils for most areas is 1 lb. of sand per gallon of oil, it is indicated by statistical analysis of a large number of fracturing jobs.

There appears to be an exception to this in some of the softer sands on the Gulf Coast, however, where higher sand densities appear to produce more favorable results. In these cases 2 lb. per gallon seem to be optimum, for greater sand densities frequently cause the sand to screen out during fracturing operations.

Viscosity of fracturing fluids . . . High viscosity in fracturing fluid does not now appear to be nearly so important as was earlier believed. Many wells have been successfully fractured using 40° A.P.I.-gravity crude oil and also water as the sand-carrying media. A number of these jobs have been conducted "down the casing." In a few cases some sand has been found in the well after the job; however, this sand has not usually affected the performance of the operation.

It is very probable that fracturing oils having approximately 10 cp. viscosity will exhibit a performance comparable to that obtainable with very viscous oils and gels, particularly if these fluids can be given low-fluid-loss properties.

Oil flush . . . It has been a somewhat common practice to inject rather large volumes of flush oil into the formation behind fracturing jobs. It may be that this practice results in the displacement of the sand in the fracture away from the well bore.

It has been established that fracturing jobs without the use of the sand-propping agent do not produce satisfactory results. This is probably because the fracture tends to seal itself after the removal of the fracturing pressure, thus nullifying the effect of the job. For this reason we question the value of the injection of flush oil following fracturing jobs.

Perforations vs. Open Hole

Statistical data indicate that fracturing jobs conducted through perforations produce better results than those conducted in open-hole sections. For example, an analysis of 30 jobs conducted in North Texas through perforations and in open-hole sections revealed an average production increase of 167 per cent for open-hole sections and 434 per cent for perforated intervals. In addition an analysis of fracturing jobs in East Texas presented at the East Texas Engineering Association meeting, June 10, 1953, disclosed that 12 of 22 wells completed through perforations were successfully fractured while only 1 of 13 wells responded satisfactorily when treating open-hole sections.

It has been definitely established that multiple fracturing occurs during conventional fracturing treatments of perforated intervals, while there are few data to indicate that this happens during the treatment of open-hole sections. It is believed that this multiple fracturing in perforated intervals is responsible for the difference in the results being obtained.

This consideration is particularly important when treating sand sections containing shale stringers. Since shale stringers frequently are the first to break down, open-hole treatments may result only in fracturing one shale section. When treating through perforations, however, the multiple fracturing which usually occurs may result in fracturing sand as well as shale sections.

THE AUTHOR

Roscoe Clark is with Western Co., Midland, Tex. At the time of this symposium, he was research group leader with Continental Oil Co., Ponca City, Okla. Clark was formerly associated with Dowell Incorporated and Stanolind Oil & Gas Co.; and he holds a M.S. degree in petroleum engineering from University of Tulsa.

Two Lines in a Single River Trench

(Continued from page 93)

selected backfill was required over 3,500 ft. of the pipelines between the Pierhead line on the Pennsylvania side and mud flats on the New Jersey side. The hydraulic dredge Pennsylvania pumped in backfill material through the extended anchorage and existing anchorage. The bucket dredge Commodore supplied fill which was bottom-dumped from scows through the channed and to the Pierhead line. Approximately 250,000 cu. yd. was used in the backfill.

Surveys . . . For survey of the trench, Missouri Valley Dredging put together a spud barge 113 by 16 by 4 ft. using 60-ft.-length spuds. The trench was surveyed on 20-ft. intervals except on the slopes where 10-ft. soundings were taken. Sextant charts were used for location.

After the pipelines were water tested to 1,200 psi. the Army Engineers were called in to survey the completed line. Using a diver, the engineers took soundings on each line at 100-ft. intervals between the Pierhead line and the mud flats. The outside areas were surveyed by Missouri Valley Dredging engineers. Results of the Army Engineers' soundings showed the lines to be from 2 to 4 ft. deeper than required.

Line patrol . . . A 24-hour patrol was maintained over the pipeline area from the start of the pulling operations until completion of the backfill. The patrol boat was supplied by Gates Bros. Marine Service.

Construction personnel . . . Sinclair Pipe Line Co.: Lewis B. Moon, vice president; Glen Giles, construction manager; Bill Moore, inspector; Hank Brainerd, engineer.

Gulf Oil Corp.: Bill Mackey, inspector; Red McCullough, foreman.

Missouri Valley Dredging Co.: Joe G. McMaken, president; Virgil M. Bull, vice president; Eldon Sumrall, pipeline superintendent; Charles Hobbs, superintendent; Jim Crawford and Andy Person, engineers.

Gates Bros. Marine Service: Bob Gates, president; Walt Gates, vice president.

American Dredging Co.: M. H. Greaser, vice president; Mel Goldstrohm, engineer; Arthur Herron, superintendent.

Acme Pipelines Construction Co.: Tom Monaghan and Joe Quinn, owners.

BOOK

OIL FOR TODAY AND—FOR TOMORROW. Published by Interstate Oil Compact Commission, Box 3127, Oklahoma City. 84 pp.

This attractive booklet deals with the origin, production, conservation, and importance of oil and gas. It fills a need for the presentation in condensed form of important aspects of the production and conservation problem in a way that laymen and students can understand. The booklet is a compilation of chapters written by some of the nation's foremost authorities. It is illustrated by simple sketches which do a good job of getting ideas across to the reader.

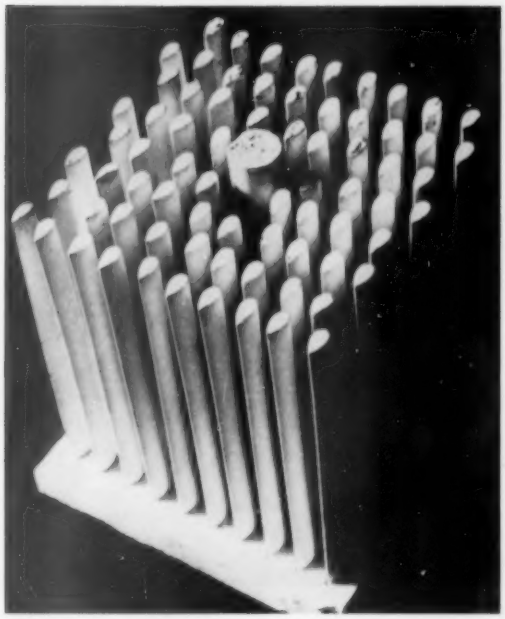


Fig. 1—Closeup view of the Oxycat with one end plate removed.

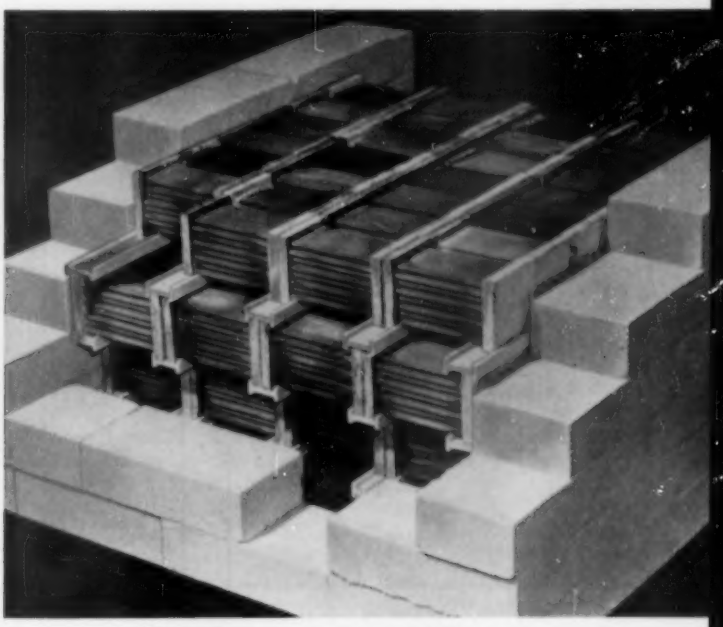


Fig. 2—General arrangement of installation.

NEW LIGHT ON

Disposal of Refinery Waste Gases

New combustion catalyst used in recovering heat from flue gases

by D. B. Ardern* and Raymond C. Lassiat†

NEW techniques are being applied by Sun Oil Co. for the recovery of heat by catalytic burning of combustible materials in catalytic cracking unit gases. Several units are now in the actual operation of recovering heat from flue gases, and other units are in the process of design or construction.

Altogether, upon completion of Sun's present plans, it is anticipated that flue-gas heat-recovery equivalent to 300,000 bbl. per year of fuel oil will be realized.

Burning CO . . . Large quantities of air are required to burn the coke formed on the catalyst during the cracking reaction. A substantial portion of the burned carbon appears in the flue gases as carbon monoxide. The heat losses represented by this material are substantial because of the high heat of combustion and the large quantities of flue gases involved.

These flue gases are generally available at temperatures of 900° F. or higher. At these temperatures recovery of the sensible heat is hardly worth while; however, when the carbon monoxide and occasional traces of hydrocarbon present are burned, a temperature is then obtained at which heat recovery is economically practical.

Potentially large quantities of recoverable heat are thus available from these gases, and substantial fuel savings can be realized by the recovery of such heat. Rough calculations indicate that, industry-wide, the combustion heat from unburned carbon monoxide, plus the recoverable sensible heat from flue gases, amounts to the equivalent of at least 10,000,000 bbl. of fuel oil per year.

New catalyst . . . The Sun Oil installations are utilizing "Oxycat," a new combustion catalyst recently developed and made available by Oxy-Catalyst, Inc., Wayne, Pa.

The Oxycat consists essentially of an alloy of platinum and alumina which is coated in a 0.003-in. layer on porcelain rods. The rods are assembled in bricklike elements which are 5½ in. long, 3⅛ in. high, and 3 in. wide.

These elements (Fig. 1) are made up of two ½-in.-thick porcelain end plates connected by a central porcelain support bar, and the catalyst-coated rods are mounted between the end plates. The catalyst rods are made with a teardrop-shaped cross-section. The gas flow is directed against the rounded end and toward the pointed end of the teardrop for low-pressure drop and efficient catalyst contact.

The Oxycat elements are stacked in layers, with the element end plates resting on H-shaped porcelain spacer bars (Fig. 2). The whole catalyst bed, in turn, can be supported on a perforated tube sheet, subway grating, or firebrick checker work, if operating tem-

*Supervisor of technical service, Houdry Process Corp., Philadelphia, and †catalytic cracking consultant, Sun Oil Co., Philadelphia. Paper presented before midyear meeting, A.P.I. Division of Refining, Houston, May 12.

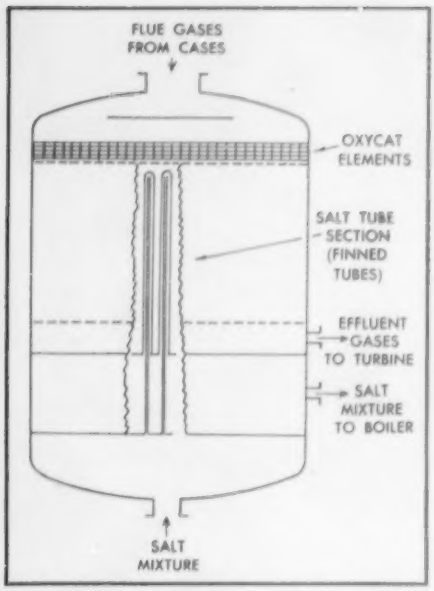


Fig. 3—Combustion cases in an Oxycat unit.

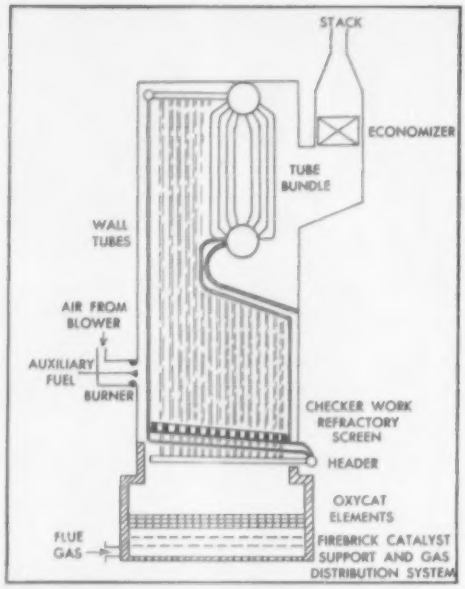


Fig. 4—Oxycat boiler for catalytic cracking units.

peratures make the use of metal construction inadvisable. High-temperature alloy metal or firebrick construction is generally recommended.

The pressure losses through the Oxycat elements are very low, and pressure drops of only 0.3 to 0.4 in. of water are obtained when the elements are operated at design space rate with four or five layers of catalyst elements. Actually, it is sometimes necessary to build some pressure drop into the distribution system in order to facilitate distribution.

The temperatures required to initiate combustion are generally in the range of 400° to 700° F., depending upon the substance which is being burned, the space velocities, and the concentrations of oxygen and combustible material. The upper safe temperature limit for the catalyst is believed to be approximately 1,800° F., although operations have been restricted generally to a maximum of 1,600° F., as a safety factor to insure maximum catalyst life.

Should the combustible content of the waste gas be such as to result in greater temperatures, excess air or other diluent material may be added to control the effluent temperature. Combustion by steps, with intermediate cooling between steps, also can be used; and the amount of excess air required is thereby reduced.

Present installations. Upon development of the Oxycat, Sun modified the combustion cases of two 12-case Houdry fixed-bed cracking units. In these units the cases operate on a time cycle in which they are alternated between periods of reaction, purging, and burning of coke. The periods are staggered so that the cases are on different phases of the cycle at a given time. In this way the operation is made semicontinuous.

The composition of the flue gas from any single reactor varies widely during the burning period. The composition in a typical 12-minute burning period may vary, for example, from 0.9 per cent oxygen and 4.3 per cent carbon monoxide at the start of the burning period to 12.4 per cent oxygen and 1.8 per cent carbon monoxide at the end of the period.

As a result, there is sufficient oxygen for the combustion of the carbon monoxide during only part of the burning period. By staggering the periods of reactors which are simultaneously in the burning portion of the cycle and

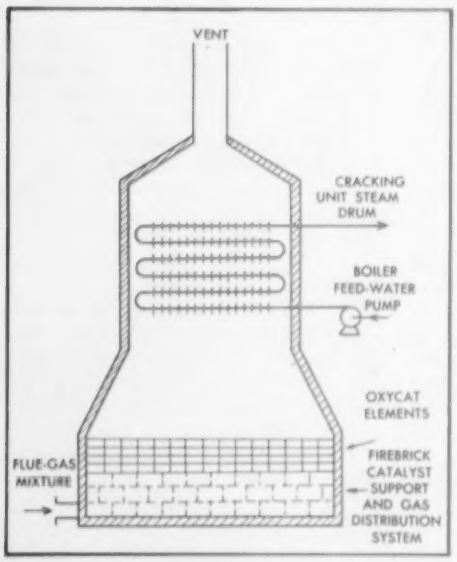


Fig. 5—Oxycat boiler planned for existing moving-bed cracking unit.

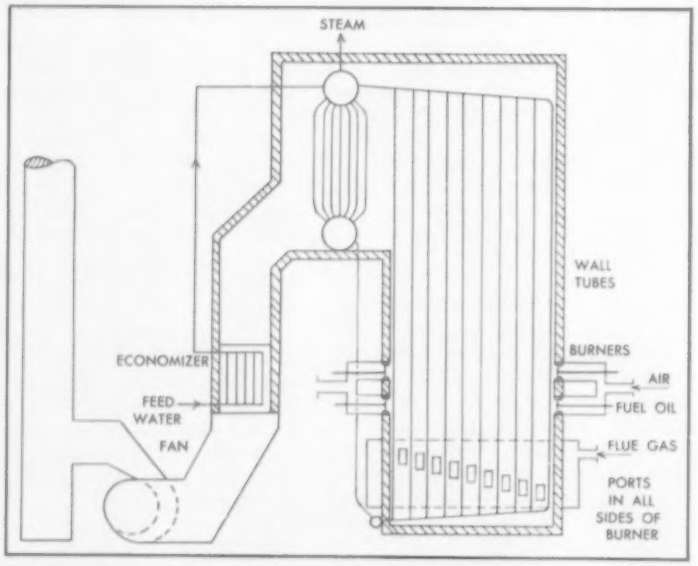


Fig. 6—Boiler for a flue gas burner fired with auxiliary fuel. Ports are vertically staggered to provide swirling motion of rising gases.

by passing the combined flue gases from these reactors to the Oxycat burner, adequate oxygen is supplied at all times.

In the present setup (Fig. 3) the flue gases enter at the top of the case; then pass around a baffle, and down through the catalyst bed which is supported on an 18-8 chrome-steel-alloy tube sheet. The Marcus Hook and Toledo units each contain about 2,800 Oxycat elements. The hot gases then pass down through the finned tubes, which circulate salt mixture, and out of the cases through exit lines in the side of the vessel.

Operating Data

The operating data are shown in Table 1. These indicate that the carbon-monoxide conversion is 85 to 90 per cent complete. Conversion is apparently somewhat higher on the Marcus Hook unit because of lower space velocity through the bed. Throughput on this unit is limited jointly by the compressor performance and pressure losses in the piping to the Oxycat cases. Although the conversion is somewhat lower on the Todelo unit, the over-all recovery is much greater.

The gases are admitted to the Oxycat cases at a temperature from 750° to 820° F., and their temperature increases 300° to 400° F. when these gases pass through the Oxycat bed. Removal of heat by the tubes which contain salt mixture then cools the gas approximately 300° F.

A calculated steam production of about 21,000 lb. per hour is shown for both units. A total heat recovery of 27,000,000 B.t.u. per hour is calculated for these units, which figure includes heat recovered by the gas turbine as a result of the increased flue-gas temperatures. In terms of fuel-oil savings per year, this amounts to approximately 40,000 bbl. of fuel oil per year.

Economics . . . The economics of the Sun Oil Co. catalytic heat-recovery units are quite clearcut. On the basis of fuel oil at $2.00 per barrel, the initial cost of the catalyst has been paid off in less than a year. Inasmuch as there has been no detectable loss of activity in approximately 2 years of operation, replacements can be expected to be very infrequent.

Cost of replacement, if and when required, will be only a fraction of the initial cost, because the active material can be recovered and reused. The cost of replacement thus is paid off in approximately 3 months.

Future installations . . . Sun Oil is presently engaged in the construction of two large Houdriflow catalytic cracking units, each replacing a fixed-bed unit at Marcus Hook and Toledo. These units will each have a charge rate, fresh feed plus recycle, of 27,000 bbl. per day. Provisions for heat recovery from the flue gas are incorporated in the design of these units.

Fig. 4 shows the general arrangement of the waste-heat-recovery units. The flue gas will enter a combustion chamber built in the lower part of a two-drum boiler. A refractory checker work will support the Oxycat elements. After passage through the catalyst the hot gases will transfer most of their heat to the boiler, and finally will be exhausted through an economizer.

Auxiliary burners located in the firebox of the boiler will provide full standby capacity for startup of the cracking unit when steam demand is particularly heavy, as well as additional capacity if needed. This feature will make the cracking units substantially independent of outside steam sources. The Oxycat elements will be shielded from direct radiation of the auxiliary firing by a combination of tubes and refractory checker work.

Each unit will handle approximately 200,000 lb. per hour of flue gas, with a heat recovery of the order of 50,000,000 B.t.u. per hour.

In addition to these new projects plans are also under way for the equipment of an existing moving-bed unit and another existing fixed-bed unit at the Marcus Hook refinery, with catalytic oxidation facilities for heat recovery.

In the installation for the moving-bed unit (Fig. 5) flue gas will be passed through Oxycat elements and then cooled by force circulation of water in finned tubes. The stream produced will be separated in the steam drum of the cracking unit.

In the fixed-bed unit the heat of combustion of carbon monoxide will be used for the purpose of producing power by providing higher temperature of the flue gas which passes through the gas turbine.

Air-pollution control . . . The effectiveness of Oxycat elements in the correction of an air-pollution problem is being demonstrated at the refinery of Standard Oil Co. of Texas, in El Paso. Traces of high-boiling vapors in a moving-bed cracking-unit flue-gas stream, which are not completely stripped under the particular operating conditions used, are burned, together with carbon monoxide, so as to produce a completely clear stack effluent.

The flue gas from the top zone of the kiln, which contains the bulk of the carbon monoxide and other combustible material, is mixed with air and flue gas from the bottom zone of the kiln for the oxygen supply, and the mixture is passed through a burner which contains the Oxycat elements.

Because of the high carbon monoxide content of the top-zone gas excess air and bottom-zone gas are added as diluents for temperature control. The mixed gases enter the burner at approximately 700° F., and pass out of the burner at 1,400° to 1,600° F. The effluent gases, under these conditions, are completely clear in appearance, and the carbon monoxide content is reduced to a trace.

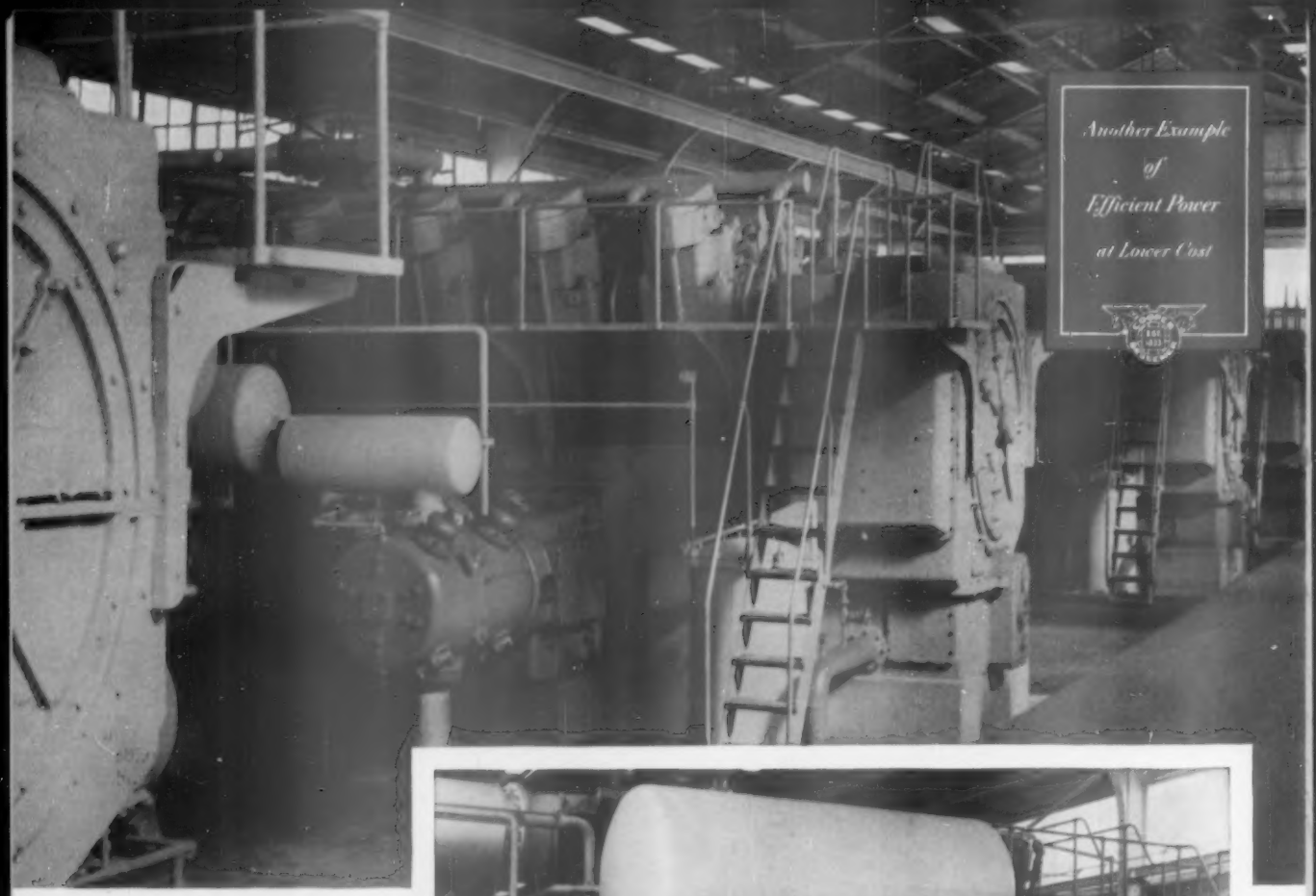
Combustion of flue gases . . . In another development in which a substantial in-

(Continued on page 109)

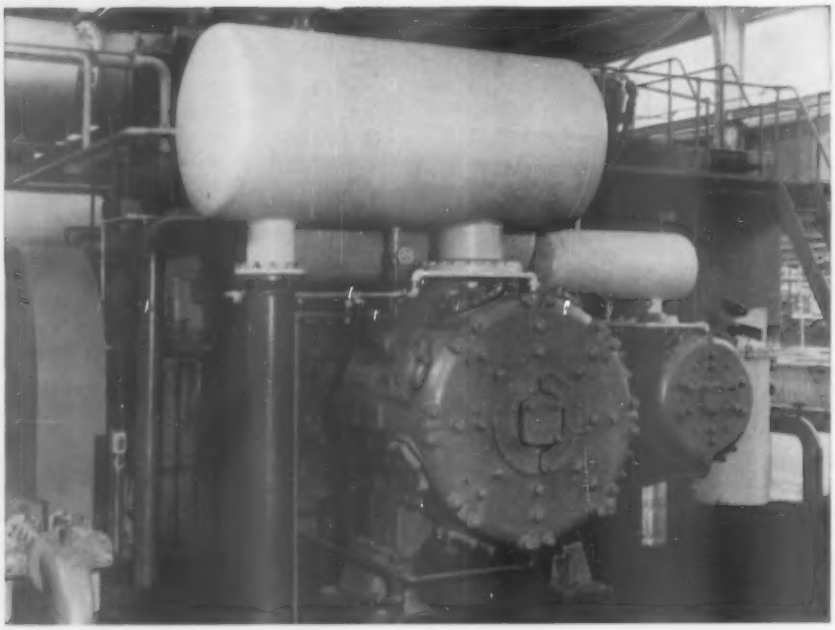
TABLE 1—TYPICAL OPERATING DATA

	Marcus Hook	Toledo
Flue-gas rate, s.c.f.m.	20,000	40,000
Inlet Orsat analysis (per cent):		
Carbon dioxide	7.5	7.2
Carbon monoxide	2.4	2.9
Oxygen	8.3	9.6
Outlet Orsat analysis (per cent):		
Carbon dioxide	9.8	9.6
Carbon monoxide	0.2	0.5
Oxygen	7.2	8.4
Temperature, °F.:		
Inlet gas	760	820
Catalyst outlet	1,100	1,160
Gas from tube section	805	880
Space velocity, s.c.f.m. per catalyst element	7.1	14.2
Available carbon monoxide, lb. per hour	2,200	5,130
Converted carbon monoxide, lb. per hour	2,000	4,260
Conversion of carbon monoxide, per cent	92	83
Heat released by combustion, B.t.u. per hour	8,500,000	18,560,000
Heat absorbed by salt mixture, B.t.u. per hour	7,400,000	15,200,000
Heat absorbed by flue gas (net), B.t.u. per hour	1,100,000	3,300,000
Calculated steam make, lb. per hour	7,000	14,000
Additional power available, kw.*	70	240
Fuel-oil savings per year (including heat to power), bbl.	12,000	26,000

*Increased power resulting from increased temperature of gases which go to turbine, including effect of turbine efficiency.



Shown here are the four Cooper-Bessemer compressors, rated 2000 hp at 250 rpm, in Spencer Chemical's modern Vicksburg, Mississippi ammonia plant. These 8-cylinder GMW's compress process streams such as natural gas, synthesis gas, and nitrogen.



This close-up view of a Cooper-Bessemer GMW clearly shows the neat, simple arrangement of compressor cylinders.

ANGLE

Compressors

New York Washington, D. C. Bradford, Pa.

San Francisco, Cal. Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle, Wash.

HOW SPACE-SAVING GMW'S

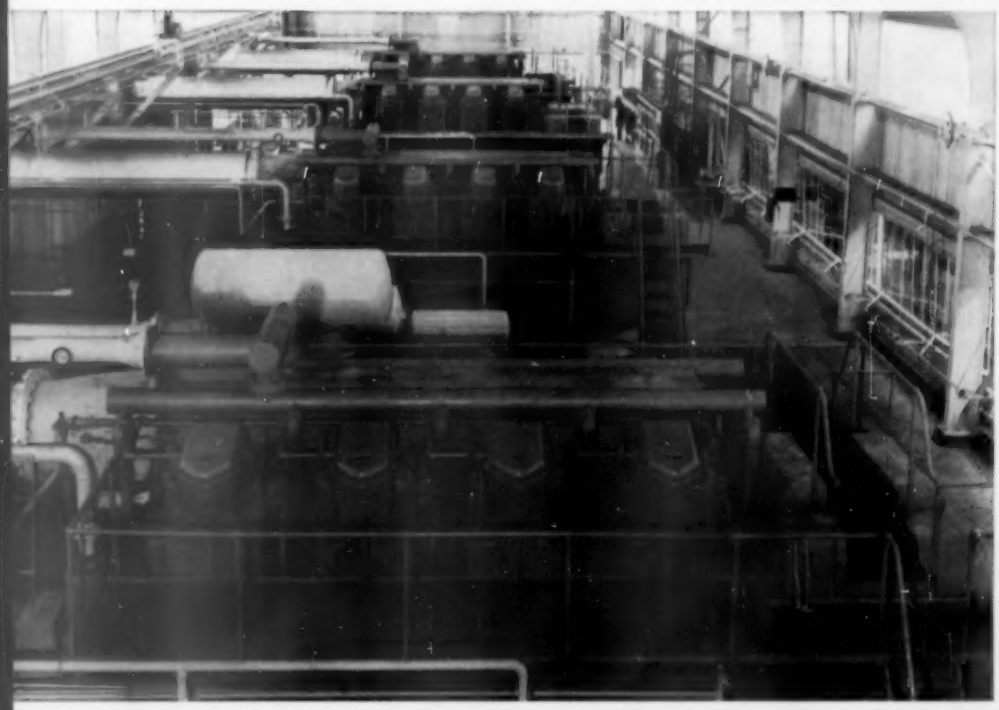
Cut Costs In Spencer Chemical's New Ammonia Plant

RUGGED Cooper-Bessemer GMW's handle the compression of natural gas in Spencer Chemical Company's large, new petro-chemical plant in Vicksburg, Mississippi. Combining several unique features, this plant is the first to use partial oxidation of natural gas to produce ammonia.

Although the four Cooper-Bessemer compressors occupy only a relatively small space, they provide an impressive total of 8,000 compressor horsepower. This high horsepower combined with few units means an important reduction in installation time, piping, foundation and building costs.

In operational cost economy, big but compact GMW's at Vicksburg mean long range savings in maintenance, personnel, and overall operating expense.

Add to these features the continued smooth-running performance of Cooper-Bessemer compressors, and you will realize why so many progressive companies rely on V-angles — GMW's, GMV's and GMX's. For additional information, contact the office nearest you.



Note the typical compactness of this cost-cutting group of GMW V-angles in the Vicksburg plant of Spencer Chemical. Substantial savings result from the high power-to-space ratio of these sturdy units.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Tulsa Shreveport St. Louis Los Angeles Chicago

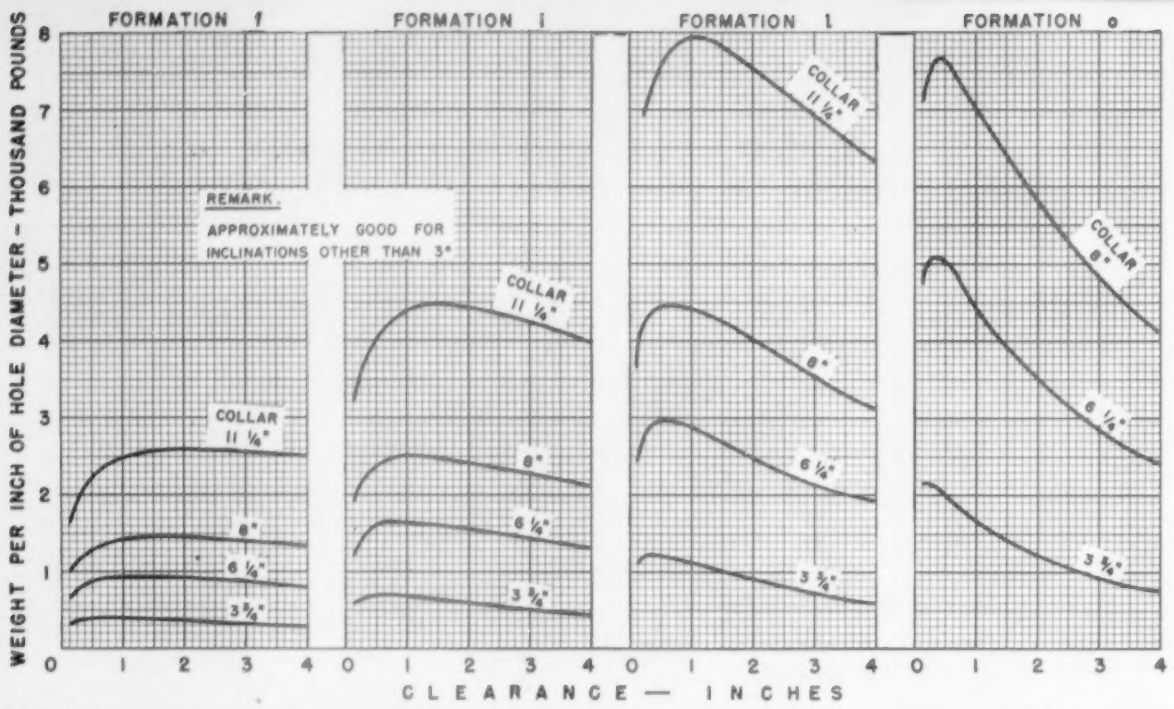


Fig. 1—Influence of clearance on weight to maintain 3° inclination. Curves on left are for very severe crooked-hole formation; proceeding to the right, progressively less-crooked formations are shown.

PROBLEMS IN HOLE DEVIATION—2

How to Determine Best Hole And Drill-Collar Size

by H. B. Woods and Arthur Lubinski

The Authors Say . . .

- Lowest drilling costs may be realized by a proper choice of collar and hole size, which might be slim, conventional, or oversize.
- The size of the most economical hole is increased by the increase of the following factors: formation crookedness; formation hardness; and depth.
- The size of the economical hole is decreased by decrease of the above factors.
- In hard and very severe crooked-hole formations, where the control of deviation is a serious problem, drilling costs may be reduced to a fraction of present costs by a large increase in collar size and hole size.
- In extreme cases 11¼-in. or even 14 or 16-in. drill collars should be used.
- In mild crooked-hole formations a small clearance between hole and collars is advantageous.
- In very severe crooked-hole formations and for a fixed collar size, hole clearance is unimportant from a rate of drilling and hole-deviation standpoint.

IT is an established fact that two rock bits of the same type but different in size will drill at approximately the same rate if the same weight per inch of hole diameter is carried.* For instance, a 10-in. bit with 20,000 lb. will drill at the same rate as a 5-in. bit with 10,000 lb.

Therefore, weight per inch of hole diameter may be taken as a measure of drilling rate. For brevity "weight per inch of hole diameter" will often be called "unit weight."

The actual relation between drilling rate and unit weight varies with formation. In most soft formations rate is directly proportional to unit weight. In certain hard formations rate is proportional to square of unit weight.

Measure of hardness . . . The following will show what the authors mean by a given degree of formation hardness:

Degree of hardness of formation	Drilling rate with unit weight of 5,000 lb. per in.
Very hard	5
Hard	10
Medium	20
Soft	40
Very soft	100

(Approximate feet per hour)

*Weight per inch of hole diameter and not weight per square inch of hole area (see Reference 1).

Authors are with Hughes Tool Co., Houston, and Stanolind Oil & Gas Co., Tulsa, respectively. Paper presented at A.P.I. Mid-Continent district meeting, Oklahoma City, March 18, 1954.

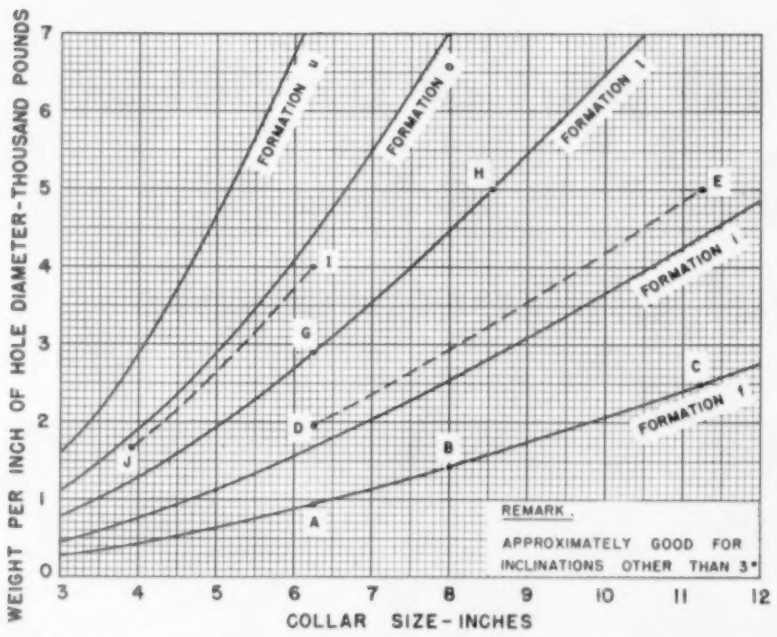


Fig. 2—Influence of collar size on weight to maintain 3° inclination with 1-in. clearance.

Measure of crookedness . . . Comparison will be made between formations having different crooked-hole tendencies. The following will show what the authors mean by a given degree of crookedness:

Crookedness of formation—	Designation of formation	Approximate pounds— Weight to maintain 3° 6¼-in. collars, 1-in. clearance	Weight per in. of hole diameter
Very severe	(f)	6,500	900
Severe	(i)	12,000	1,600
Moderate	(d)	20,000	3,000
Mild	(o)	30,000	4,000
Very mild	(u)	50,000	7,000

Effect of clearance . . . Weight per inch of hole diameter to maintain 3° inclination is plotted against clearance in Fig. 1. Each curve is for a given collar size. Curves on the left are for a very severe crooked-hole formation identified as "formation f." Considering only effect of clearance, it may be seen that for formation f the curves are very flat in the range of clearances normally encountered in practice, i.e., ¾ in. to 3 in. This means that for a given collar size and for very crooked-hole formations, variation of clearance within wide limits has no appreciable effect on hole deviation.

Clearance can thus be established by other considerations. An advantage of small clearance such as 1 in., is that doglegs cannot be severe. On the other hand, in some formations, small clearances appreciably increase sticking or fishing hazards.

Proceeding to the right from formation f in Fig. 1, progressively less-crooked formations are encountered.

For moderate to mildly crooked formations "i" and "o," the curves are not flat and the unit weight varies considerably with clearance. The optimum conditions are for small clearances. Thus, it appears that the practice in the Permian basin of using ¾-in. to 1-in. clearance is justifiable.

Effect of collar size . . . Another conclusion to be reached from inspection of Fig. 1 is that collar size is of great importance on hole deviation. For this reason, Fig. 2 was prepared. It shows the weight per inch of hole diameter with which 3° hole inclination may be maintained as related to collar diameter.

Each curve is for a different crooked-hole formation identified by the same letters as in Fig. 1. The curves were calculated for 1-in. clearance. They actually hold true for severe and very severe crooked-hole formations, such as "i" and "f," in the entire range of clearances encountered in practice.

Assume a very severe crooked-hole formation for which only 930 lb. per inch of hole diameter with 6¼-in. collars results in a 3° hole inclination. These conditions are represented in Fig. 2 by point A. Drilling with such light weight is expensive.

However, the same hole inclination could be maintained with higher unit weight with large collars. For example, points B and C show that 8-in. and 11¼-in. drill collars would permit carrying 1,420 and 2,480 lb. per inch of hole diameter respectively. Generally the rate of penetration is at least proportional to unit weight; therefore, using 8-in. or 11¼-in. drill collars instead of 6¼-in. collars, should result at least in increases of rate of 53 per cent (1,420/930 = 1.53) and 167 per cent (2,480/930 = 2.67).

If the crooked-hole formations were also very hard, 5,000 lb. per inch might be needed for high drilling efficiency. Extrapolation of the curve "f" to 5,000 lb. per inch indicates that extremely large collars would be needed. Therefore, a logical solution is to choose as large collars as possible and, in addition, deliberately accept more hole inclination.

Severely crooked . . . Assume that we are willing to accept 8°. Then, using the data of point A of Fig. 2 as "established data" using the deviation chart in the previous issue, it is found that 1,950 lb. per inch of hole diameter (assuming 45° dip) would result in 8° hole inclination.

Locate point D, Fig. 2, (1,950 lb., 6¼-in. drill collars). A curve interpolated through this point will correspond to formation f but now for 8° rather than 3° hole inclination.*

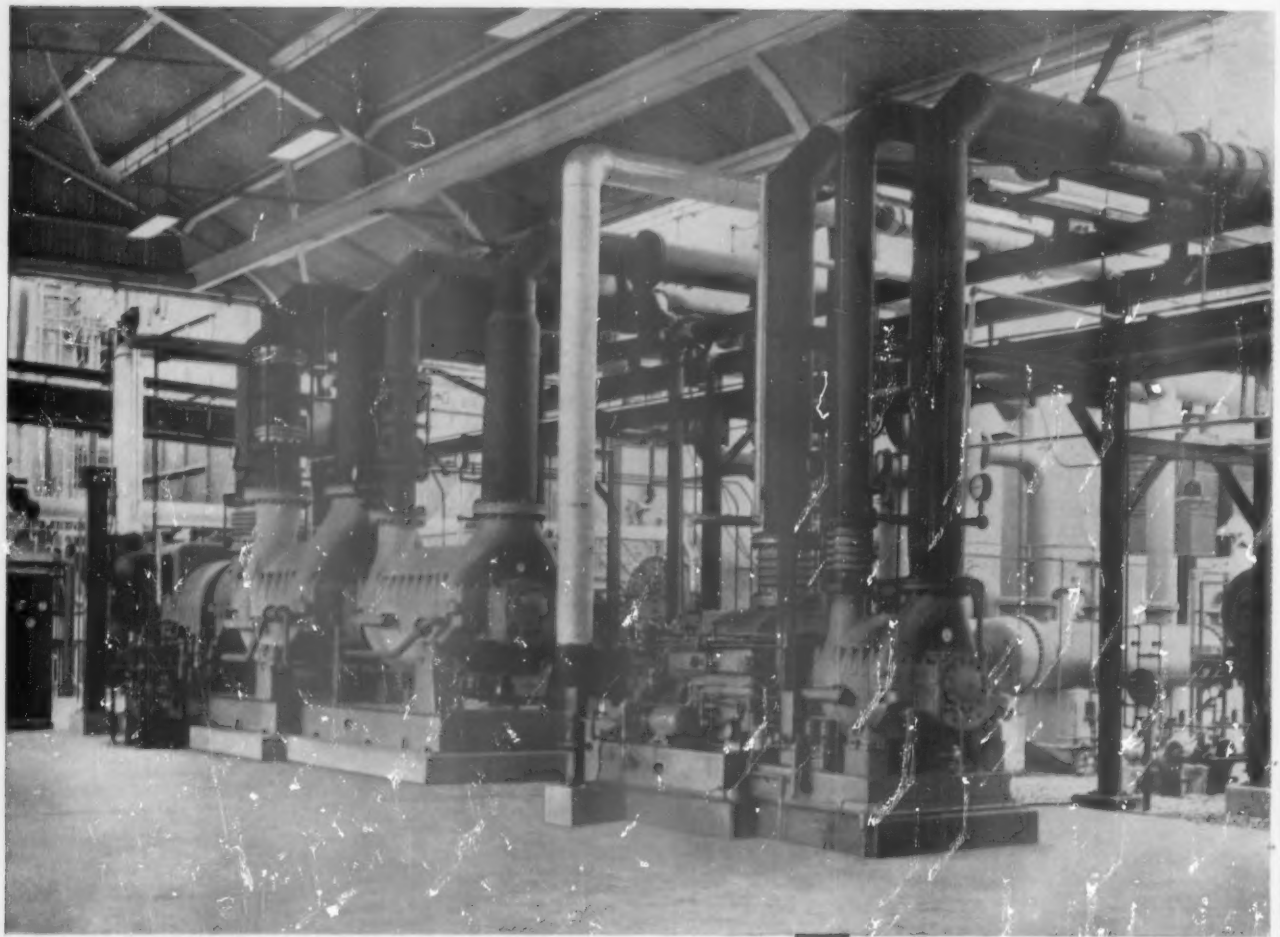
Point E, located on the same interpolated curve as point D, indicates that now 11¼-in. drill collars would allow carrying 5,000 lb. per inch of hole diameter. Thus the increase of collar size and acceptance of a higher inclination should result in an increase of rate of at least 440 per cent (5,000/930 = 5.40).

Moderately crooked . . . Consider moderate crooked-hole conditions. Assume that 2,900 lb. per inch of hole diameter results in a hole inclination of 3° for 6¼-in. drill collars and 1-in. clearance (point G, curve l, Fig. 2). If formation hardness makes it desirable to drill with 5,000 lb. per inch of hole diameter, then point H, located on the same curve as G, shows that this may be accomplished with 8½-in. collars.

Mildly crooked . . . Finally consider

*Fig. 2 was prepared for 3° hole inclination. However, the difference between curves for 3° and other inclinations is not very significant and actually Fig. 2 may be used for any hole inclination. In such case some other curve, one point of which must be located by the deviation chart, applies to the particular formation.

Three newest partial oxidation plants in the U.S. use centrifugal air compressors



On the left a 5000 BHP steam turbine drives a five-stage No. 4 Compressor and an eight-stage No. 3 Clark Multi-Stage Centrifugal Compressor. Rated at 20,000 CFM, air is pumped to 125 PSIG. The other unit is a Clark four-stage No. 2 Centrifugal Compressor rated at 650 BHP compressing nitrogen.

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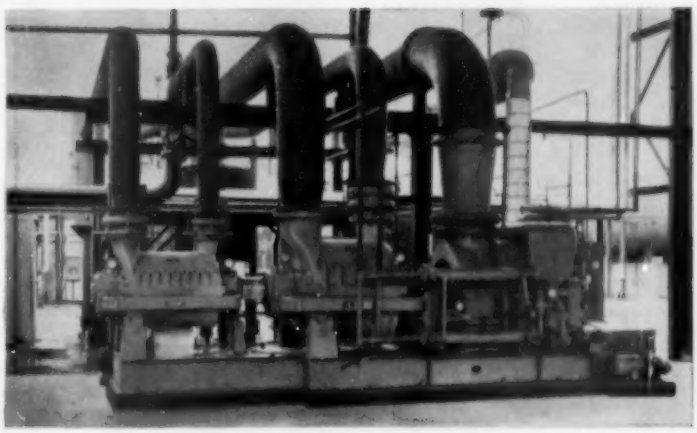

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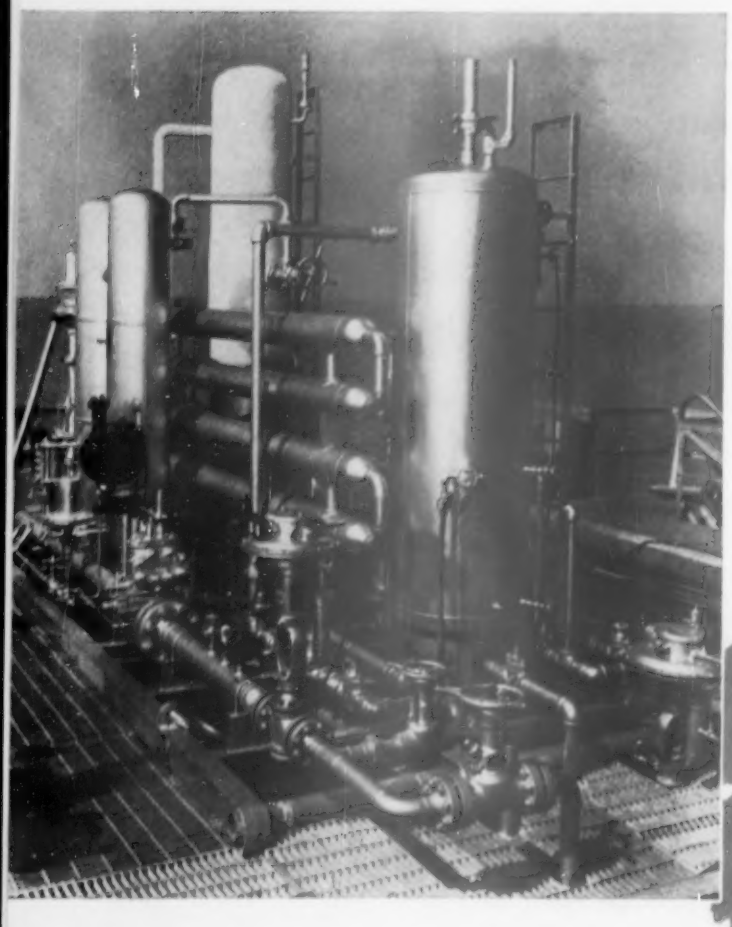

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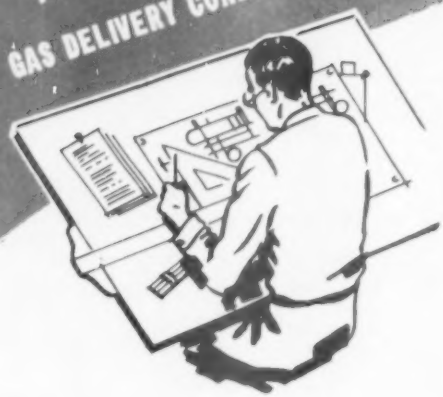

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mild crooked-hole formations. Assume that carrying 1,660 lb. per inch of hole diameter with 6¼-in. collars and 1-in. clearance results in a hole inclination of 1°. Furthermore, assume that the formations are soft and that there is little need for carrying more than 1,660 lb. per inch.

If a greater deviation, say 3°, may be accepted, the use of smaller collars might be contemplated. Using 1,660 lb. per inch, 1° hole inclination and an assumed dip of 10° as "established data" with the chart in the previous issue, it is found that 4,000 lb. per inch of hole diameter would result in a 3° hole inclination. This corresponds to point I, Fig. 2.

Point J, located on the same interpolated curve as point I, indicates that now 4-in. drill collars would permit carrying 1,660 lb. per inch with a resulting hole inclination of 3°. This means that the hole size could be decreased to 5 in.*

When the control of crooked hole is a serious problem and progress is very slow compared to what it might be if the same formations were lying flat, drilling rate may be increased by increasing collar size or both collar size and hole size.

Crooked-hole problems decrease as collar size increases; and the load capacity of rock bits increases as hole size increases. Thus, as hole and collar size are increased, a situation is finally reached where acceptable deviation is maintained and at the same time rock bits are operated at the weight for most efficient drilling.

In some cases the use of very large collars (14 to 16 in.) may be indicated which is not in the realm of present-day thinking. However, 11¼-in. collars appeared unreasonable a few years ago but they are being used economically now.

When crooked hole is not a problem and formations are soft, it may be possible to reduce collar size and hole size and still maintain an acceptable drilling rate.

Other factors . . . The above quantitative considerations show why crookedness and hardness of the formations are major factors in choosing the most economical hole size. The study of other pertinent factors is beyond the scope of this article and they will be only qualitatively mentioned. These factors, not necessarily in the order of their importance, are as follows: Bit costs, round-trip expense, daily rig and moving expense, depth of the well, casing and cementing costs, mud expense, etc.

With the same unit weight, footage per bit is higher with large bits than with smaller bits. This difference is accentuated in crooked formations, in which, as shown in the previous examples, it is necessary to use considerably less unit weight with small bits. Actually, although larger bits are more expensive, a large-bit program should result in a lower bit bill.

Fewer round trips will be made with large bits. This may be of little consequence at shallow depths but it is extremely important in deep holes.

On the other hand, smaller holes permit the use of smaller and less-expensive rigs, pumps, and other equipment, resulting in lower daily and moving costs. These considerations become more predominant as formations become softer and less crooked and wells become shallower. Thus there are conditions for which slim holes are the most economical.

Casing and cementing costs may increase with hole size.

A large hole necessitates a larger mud system but the additional cost may be offset by a shorter drilling time.

Thus, it may be stated in a general way that when the crookedness and hardness of the formations and the depth of the well increase, then the size of the most economical hole is progressively shifted toward larger holes and vice versa.

*Burgess reports the use of 3¾-in. collars in a 4¾-in. hole.[3]

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Disposal of Refinery Waste Gases

(Continued from page 101)

crease in steam supply is needed a different approach to recovery of heat from flue gases will be used by Sun. In this instance there exists a steam demand which greatly exceeds the amount of heat available from the flue gases. Because, in any event, burning of considerable additional fuel would be required, plans have been made for the use of the additional fuel to provide a temperature sufficient for thermal combustion of the carbon monoxide in the flue gases. Steam will then be produced from the heat released by the flue gases and auxiliary fuel.

Fig. 6 shows the general arrangement of a boiler which was under erection at Toledo. Flue gas from an existing Houdriflow catalytic cracking unit is to be injected through multiple ports in the lower part of the boiler. The ports are vertically staggered so as to provide a swirling motion of the rising gases.

Auxiliary firing is supplied above the level of the flue-gas inlet, thus providing a temperature well above the ignition temperature of carbon monoxide.

After they have passed through the boiler superheater, convection section, and economizer, the products of combustion are mixed with the residual flue gas, and are exhausted through a draft fan.

The unit will receive approximately 150,000 lb. per hour of flue gas, which contains approximately 4 per cent carbon monoxide, at 850° F.

Auxiliary firing of 10,750 lb. per hour of heavy fuel oil will result in the production of 190,000 lb. per hour of 500-psig. steam, superheated to 575° F. The heat absorbed from the flue gas alone will amount to 40,000,000 B.t.u. per hour, thus resulting in a fuel-oil economy of approximately 60,000 bbl. per year.

Without flue-gas injection the boiler will be capable of producing, by direct firing, 220,000 lb. per hour of steam at similar conditions of temperature and pressure.

Rister to Author Centennial History; Seeks Support

Dr. Carl Coke Rister, distinguished professor of Texas Technological College, Lubbock, Tex., has been authorized by the Tech Foundation to write a centennial history of the American oil industry. The hundredth anniversary of the drilling of the Drake well will be in 1959.

Dr. Rister is the author of "Oil! Titan of the Southwest," written while he was member of the history department of University of Oklahoma. Dr. Rister will appreciate the loan of pictures, documents, and other historical information concerned with all divisions of oil operations.

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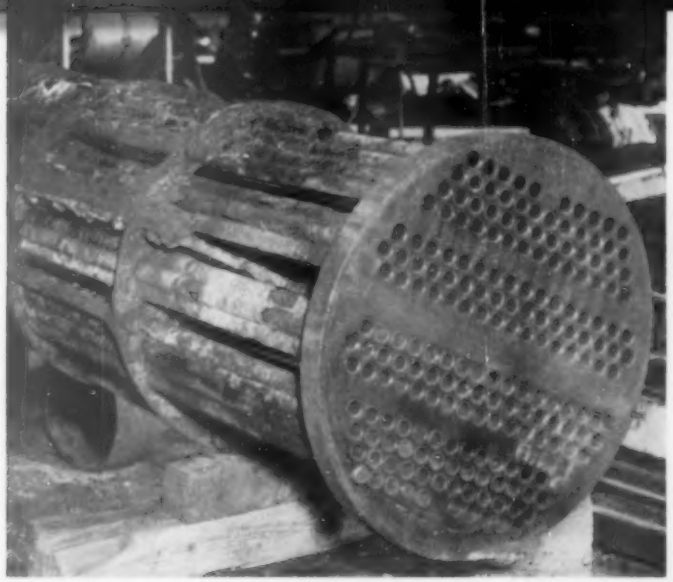


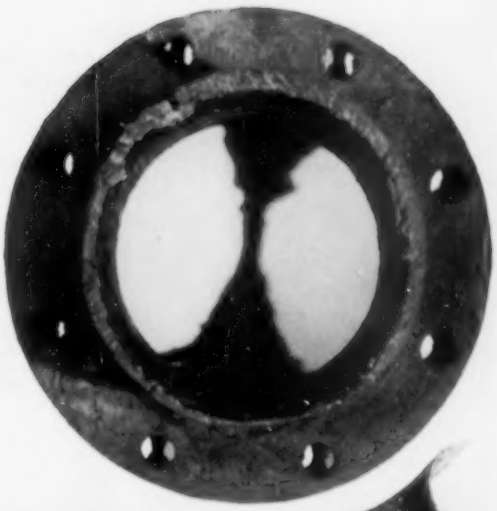


Fig. 1—(Above) Heavy accumulation of scale from line corrosion reduced the efficiency of this heat-exchanger tube bundle.

Fig. 3—(Top, right) This flange was on line on a unit processing coastal crudes.

Fig. 2—(Right) Prolonged corrosion caused holes to appear in this gasoline rundown line.

Curb this costly damage . . . New organic inhibitor helps

Control Corrosion and Improve Product Quality

. . . Product neutralizes organic acid and scrubs out inorganic

by F. Lawrence Resen
Gulf Coast District Editor

THE ever-present problem of crude-unit corrosion is being attacked by neutralization of organic acids at Southwestern Oil & Refining Corp.'s Corpus Christi refinery.

The method developed by Southwestern consists of the injection of NaOH into crude units to saponify organic acids contained in the crude charge. The resultant "metallic soap," which results from the neutralized organic acids, can be further used to scrub out inorganic acids also in the unit.

The Sapoil process, as it is called, was specifically developed to control corrosion and improve product quality on units processing Gulf Coast crudes, characteristically low in sulfur and corrosion-producing brine, but relatively high in organic acids which contribute to high-temperature organic corrosion. However, it has been used successfully during a 1-year period when high-sulfur Mexican crude was used as a charge stock.

The use of Sapoil serves to keep the condensate of all streams neutral, thereby eliminating the need for ammonia injection or inhibitor addition. In this manner, the very minimum of scale is produced with cleaner exchangers and higher unit efficiency resulting.

Coastal corrosion . . . While high-sulfur crudes are the ones most prominently mentioned when corrosion is discussed, a significant amount is present in typically sweet coastal crudes. Examples of the effects of running such crudes may be seen in Figs. 1-3. In Fig. 1 may be seen a tube bundle which had been performing in a unit operating predominantly on sweet crudes. While the interior of the tubes remained clear, the deposition of scale due to line corrosion is such as to seriously hamper the heat-transfer efficiency of the exchanger. A gasoline rundown line is shown in Fig. 2. Upon close inspection, it may be seen that the corrosive effects have been such as to cause holes to appear in the line. This line, as well as the flange in Fig. 3, corroded in coastal crude service.

Southwestern experimented with the metallic-soap approach for some 5 years, and found that corrosion was not only inhibited, but that detergent action was also taking place.

Reaction . . . The process is based on the reaction of sodium hydroxide at elevated temperatures with organic materials such as the organic acids in petroleum. Since the 15° B. caustic injected enters a system operating at 650°-675° F., the water content flashes to steam and caustic crystals enter in

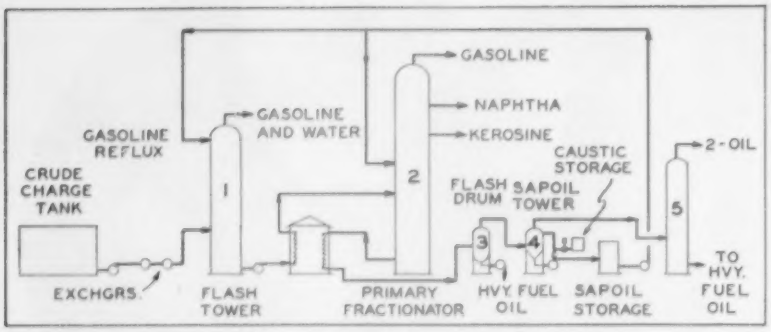


Fig. 4—Diagram of a Sapoil system.

a slurry. The reactions with the organic acids may be expressed as:

$$RCOOH + NaOH \xrightarrow{\Delta} RCOONa\ (Sapoil) + H_2O \quad (1)$$

Removal of the organic-acid materials results in drastically reduced corrosion due to organic acids at high temperatures. The amount of caustic added is governed by the acid content of the hydrocarbon stream and is always somewhat below the caustic saturation point.

An added feature of the process is that the metal-organic compounds which are formed to prevent organic acid corrosion may be recycled or recovered and injected into other process equipment to control corrosion where corrosion of an inorganic nature, such as that produced by HCl, H_2S, and water, would otherwise be a problem. This reaction may be expressed as:

$$HCl + RCOONa \rightarrow RCOOH + NaCl \quad (2)$$

The organic acid returns to a unit reactor to produce more metallic soap and the NaCl remains thermally stable in the system, thereby reducing corrosive effects.

The removal of the organic acids serves to improve such fractions as the No. 2 fuel oil used in home-heating oil furnaces. An improved color stability of treated oils is also evident.

Application . . . In Figs. 4 and 5 may be seen one of several methods of applying the process to a refinery. In this particular case, the two-oil fraction is the only stream which is scrubbed to remove organic acids. The crude charge first passes into the flash tower (1) where flash gasoline and water are removed. The flash tower is protected from moisture-inorganic and light-organic acid corrosion by injecting metallic soap, which is recovered in the unit reactor, into the gasoline reflux

Flashed crude and any excess soap are then heated and enter the primary fractionator (2). This tower is protected from corrosion by scrubbing the gaso-

(Continued on page 115)

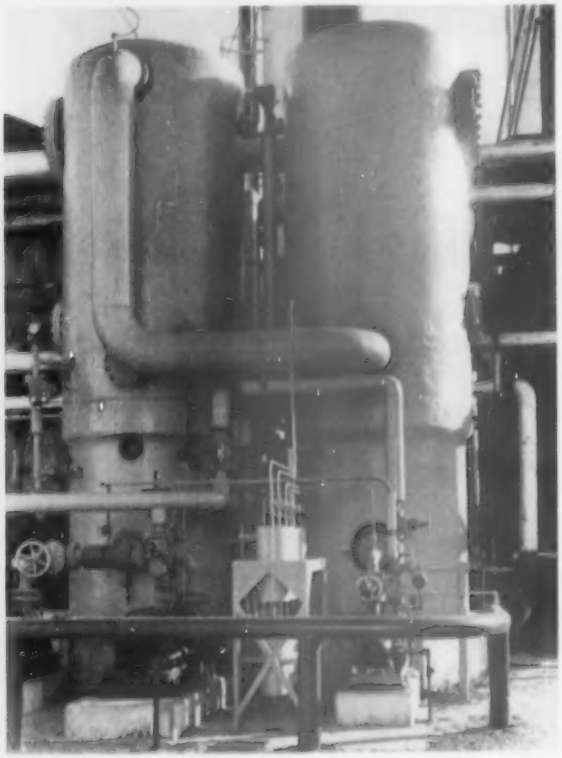
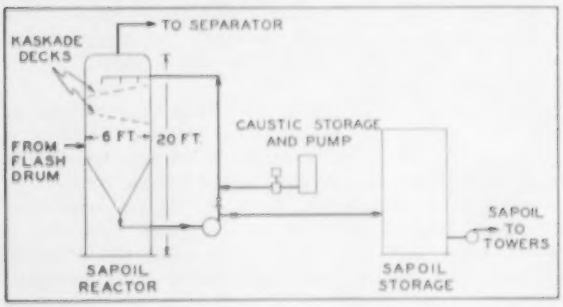
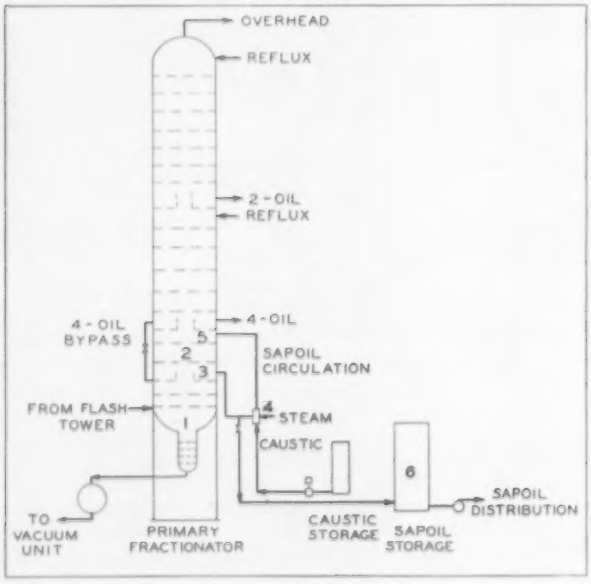


Fig. 6 — (Left) Flash drums on left and reactor tower on right are used in processing setup to scrub organic acids from No. 2 fuel oil. Bottoms from primary fractionator are flashed in the drum whose overhead enters reactor vessel. Caustic is injected into reactor through eductor. Sample pots are in center foreground.

Fig. 5 — (Below, left) Sapoil reactor, addition type. Fig. 7 — (Below) Sapoil reactor, integral type.





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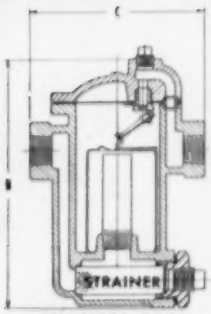

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"B"		3 1/16"	7 1/16"	9 9/16"	12 1/16"
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Capacity lbs. hr at pressure indicated	5	450	830	1600	2900
	25	460	950	1980	3800
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Drilling-Fluid Costs Too High?

Maybe your drilling practices are at fault

by E. E. Huebotter,* T. H. Dunn,† and Frank Bell‡

MAINTENANCE of drilling mud depends greatly upon the drilling practices in force. These are the conditions that may cause increased mud-maintenance expense:

- Buckling of drill string to erode hole walls.
- Wall cutting.
- Not keeping hole full on trips.
- Excessive rates of pulling or running drill pipe.
- Excessive or inadequate annular velocities.

Rotary drilling-fluid costs can be reduced by using better drilling practices, e.g., by the use of drill collars to avoid buckling of the drilling string. However, several opposing factors must generally be balanced in order to arrive at the best mud maintenance program consistent with over-all low drilling cost.

*Baroid Sales Division, National Lead Co., Tulsa; †Stanolind Oil & Gas Co., Tulsa; ‡Shell Oil Co., Wichita Falls, Tex. From a paper presented at A.P.I. Mid-Continent district meeting, Oklahoma City, March 18, 1954.

Of prime importance is the weight carried on the bit beyond the buckling strength of the drilling string. As the weight on the bit exceeds the buckling strength of the drilling string, the drilling string buckles and bears against the walls of the bore hole at the buckled points as shown in Fig. 1. If the formations at these bearing points are shale, they are subjected to the grinding force of the buckled drilling string bearing against them and are worn away.

The rate at which this erosion takes place depends upon the type of shale, the filter loss of the drilling fluid permitting wetting and softening of the shale, the drilling rate, speed of rotation, and the force with which the buckled drilling string bears against it. As the weight upon the bit is increased the drilling string will buckle in an increasing number of places, and as each buckled point passes the formation point in question, more erosion will occur resulting in progressively greater hole enlargements and a greatly accelerated rate of entrainment of native shale solids into the drilling fluid.

It is also important to drill the hole as vertical as possible because as the deviation of the hole from the vertical increases, the drilling string bears against the formations penetrated with increased force. This force accelerates the erosion of the formations into the drilling fluid and increases the grinding action upon the cuttings being carried up the bore hole. The maintenance of a vertical hole assumes even greater importance when drill collars are placed in the drilling string.

Entrainment of native shale solids normally amounts to from 5,000 lb. to as high as 150,000 lb. in a day's drilling, requiring from 41 to 1,230 bbl. of water per day to maintain a 9.8-lb.-per-gallon treated native mud. Some of this entrainment can be accounted for as resulting from the grinding action between the drilling string and the wall of the bore hole and a small portion from the grinding action of the bit. In extreme cases the maintenance of drilling fluids can be increased thirtyfold by carrying excessive weight on the bit

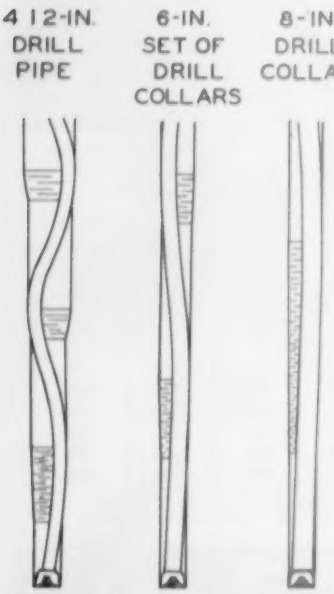

Fig. 1—As weight on bit exceeds buckling strength of the drill string, sides of the hole are ground away to contaminate the mud.

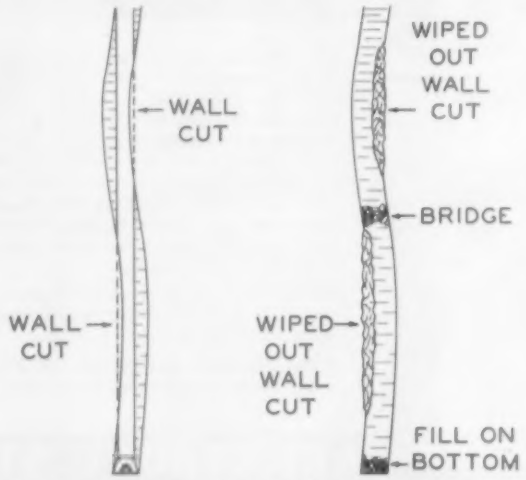

Fig. 2—Wall cuts collect debris that has to be pulverized before it can be removed; these cuts also mean hole enlargements that require higher mud viscosity.

with too limber a drilling string above the bit.

Drill collars help . . . Substituting drill collars for drill pipe above the bit, to provide the weight carried on the bit, will minimize erosion in that the drill collar string is stiffer and will not buckle as frequently as the drill pipe. Under comparable conditions, the substitution of drill collars for drill pipe above the bit, to provide all the weight carried on the bit, will reduce the amount of native shale solids ground into the drilling fluid from the shale formations penetrated, will reduce the amount of water and materials required to maintain the drilling fluid, and thus will reduce the drilling fluid costs.

The use of oversize drill collars is recommended only to the extent necessary to help drill a straight hole. As the outside diameter of the drilling string approaches the size of the bore hole drilled, the shale formations penetrated may be eroded away excessively by the increased rate of flow of the drilling fluid in the restricted annulus.

In this respect it has been observed in cases that the maintenance of a drilling fluid in a well where a 7⅞-in. hole is being drilled with 4½-in. o.d. drill pipe is greater than when drilling an 8¾-in. hole with the same size drill pipe.

Wall cutting serious . . . Wall cutting is also a serious factor in the maintenance of drilling fluids in that frequently when they are wiped out on trips, large quantities of shale forming these cuts are torn loose and dumped into the bore hole producing bridges at constricted points or fill at the bottom of the hole as shown in Fig. 2. Usually this debris must be pulverized to be circulated out of the well, resulting in a great portion of it becoming entrained in the drilling fluid and thus requiring extra water and materials and increasing drilling fluid costs. These wiped-out wall cuts also produce hole enlargements, necessitating higher viscosity and higher unit cost drilling fluids to circulate cuttings and cavings up through them.

Keep hole full on trips . . . Another important factor in the maintenance of drilling fluids is keeping the hole full on trips. Frequently exposed salt-water sands below the surface pipe will unload salt water; and possibly loose, water-soaked formations will slough and cave into the bore hole when exposed if the hole is not kept full of drilling fluid when withdrawing drill pipe.

The salt water increases the salt content of the drilling fluid necessitating the maintenance of a higher unit cost drilling fluid to obtain the same desired properties. Hole enlargements are produced by the sloughed and caved formations, resulting in higher-unit-cost mud to circulate cuttings and cavings up through the hole enlargements.

Swab and piston action . . . Careful attention must be paid in making trips to assure minimum maintenance costs of the drilling fluids. Excessively fast withdrawal of the drilling string tends to swab in salt water and wipe out any wall cuts producing hole enlargements which necessitate heavier treatments to overcome the salt contamination and result in higher unit cost drilling fluids. Better-quality drilling fluids are required to circulate cuttings and cavings up through the hole enlargements. Excessive rates of placement of drill pipe and spudding tend to break down formations, creating loss-of-circulation problems which cause increased drilling-fluid costs.

Elimination of a float in the drilling string will tend to reduce its plunger effect when going into the hole, reducing the possibility of breaking the formation down. Also in this respect, when using high-gel-strength muds, to break circulation several times while going into the hole may prevent loss of circulation due to excessive pump pressures required to obtain circulation.

Annular velocity . . . Maintaining adequate annular velocity of the drilling fluid in the bore hole to circulate out cuttings and cavings is very necessary to assure minimum drilling fluid maintenance cost. When annular velocities drop too low to effectively remove cuttings and cavings, for example in hole enlargements, either the viscosity must be increased to increase the lifting power of the drilling fluid (which increases its unit cost) or the cuttings and cavings will have to be pulverized by the rotating drilling string so they can be removed with the existing drilling fluid at the prevailing annular velocity.

Of course, the latter procedure produces excessive entrainment of native shale solids in the drilling fluid, requiring extra water and materials to make them into drilling mud. Having sufficient pump capacity on a rig to adequately circulate drilling fluid can materially reduce drilling fluid maintenance cost. In this respect it has also been found that the usual practice of raising the viscosity prior to running an electric log or taking a drill-stem test can be eliminated if normal or increased circulation and normal pipe rotation is maintained up to the time the drill pipe is withdrawn.

Organic Inhibitor Aids Corrosion Control

(Continued from page 112)

line, naphtha, and kerosine fractions with soap injected into the tower just above the flash zone. Bottoms from the fractionator are reheated and flashed in the flash drum (3). A heavy fuel-oil cut is removed from the bottom and overhead vapors enter the unit reactor (4). Both the flash drum and reactor may be seen in Fig. 6.

The reactor consists of a cone-bottomed vessel containing two Koch Kaskade trays. The solution of soap and oil is picked up from the cone bottom by a centrifugal pump, mixed with fresh caustic, and discharged onto the top Kaskade tray. The fresh caustic, which is suspended in the soap solution, is intimately contacted with the vapors at a temperature of 665° F., as the soap and caustic flow over the trays and vapors pass upward through the trays. In this manner, organic acids in the vapor as well as the organic acids released by the reaction of the soap while preventing corrosion are removed from the vapor. Vapors are passed through a separator (5) where a treated two-oil fraction is removed.

Fractionator . . . In Fig. 7, an arrangement is shown where the reactor is an internal part of the primary fractionator in a crude unit. This reactor produces soap by reacting caustic with four-oil and lighter fractions. The heated crude oil is thrown into the flash zone (1) of the primary fractionator and the four-oil and lighter vapors pass into the reactor section (2) of the fractionator. In this section the soap is produced by contacting of upflowing vapors with a mixture of caustic and soap solution flowing across two Koch Benturi trays.

The soap solution is picked up from the collector tray (3) by a steam-jet eductor (4) which introduces fresh caustic, mixes, and dumps the fresh caustic-soap solution back into the top tray (5). Excess soap solution is withdrawn to storage.

An example of the effect of this injection on the acid content of the streams leaving the fractionator may be seen in a typical pH analysis of condensate in various accumulators. While previously the pH had ranged from 1.5-2, these readings were average for the unit on a recent run:

Stripper receiver: 6.1; gasoline receiver 5.4; dehydrator receiver 6.35.

This process has a patent application pending and is licensed by Hoover Processes, Inc., Corpus Christi, Tex.

PALCO SEAL now "In The Bag" . . . for easy handling

Widely recognized in drilling operations for effective correction and prevention of lost circulation—Palco Seal is now available in loose-filled 40-lb. bags, and in popular compressed 80-lb. bales . . .

Ease of handling, rapid uniform dispersal, lasting suspension, fast caulking seal, and non-deterioration are the qualities which have put Palco Seal at the top of the list with experienced mud engineers, drillers and toolpushers. Palco Seal is an *engineered* product of research, combining long and short fibers of controlled length and size—carefully manufactured from an ideal basic raw material. Like redwood from which it is derived, Palco Seal is inherently resistant to decay or chemical deterioration. Wherever porous or thief formations occur, it quickly sets up a densely matted barrier of tightly interlocked fibers which stay put for more effective and permanent control of circulation loss. Complete dispersal means that it's always where it's needed. Low cost and lasting suspension contribute to initial and sustained economy. Application experience for over a decade gives assurance of more effective prevention and control of mud losses. Specify Palco Seal in the new 40-lb. loose-filled bags for ease of handling—or standard compact compressed 80-lb. bales.

Write for Bulletin No. 4-02 describing the properties, operating advantages, and composition of Palco Seal.

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THE PACIFIC LUMBER COMPANY

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The Combustion Gas Turbine in Natural-Gas Transmission—2

by Tracy S. Park, Jr.

GAS-TURBINE-DRIVEN compressor installations span a period of 5 years and a total of approximately 222,000 hp. Industry has a natural reticence to accept new designs of equipment, and particularly the gas industry, which as a whole has enjoyed tremendous expansion and success in the past 10 years using conventional prime movers and compressors.

Seven companies . . . The appearance of gas turbines on the pipeline scene has had an appreciable effect on the transmission industry. Practically all transmission companies have made investigations concerning the feasibility of turbines as pipeline prime movers. On the basis of these studies, 7 companies now own or operate a total of 40 machines. This does not include units which have been applied to associated process compression or electric-power generation. A short resume summarizing other applications of the gas turbine appears in a previous paper by this author presented before the petroleum branch of the A.I.M.E., October 21, 1953.

New Application Requires Time

The original Westinghouse unit, installed in May 1949, was designed to be a locomotive machine, but was adapted to pipeline service. Its small rating (1,850 hp.) does not ideally adapt it to general pipeline service. Furthermore, the Clark turbine—the first machine specifically designed and built for gas-pipeline service—did not commence regular operation until November 1952. General Electric Co. was in full production during 1952 constructing turbines for El Paso Natural Gas Co., but until the fall of that year, did not have a single machine in operation on pipelines.

Two factors . . . Thus it is apparent that the application effort of gas turbines to pipeline service has gained momentum only in the past 2 years, and has been the result of two causes: (1) the design of a machine possessing a horsepower rating, thermal efficiency, and first cost which make it attractive to the user and competitive with the conventional gas engine; and (2) the ability of a domestic manufacturer to produce these machines at a rate which will assure their availability to the gas industry when required.

Proof of the above reasoning lies in the fact that 39 of the 40 machines installed have commenced operation only in the past 2 years. A foreign manufacturer, Brown Boveri Corp., of Switzerland, has had available for purchase several sizes of single-shaft gas turbines for several years, and possesses a fine record of achievement for reliability. The availability of these European machines has had little effect on the pipeline application.

Author is mechanical engineer, Tennessee Gas Transmission Co. Paper presented at N.G.A.A. meeting, Dallas, 1954.

Fuel-Rate Considerations

The first large-scale installation of gas turbines was sold on a guarantee of 5,000-hp. output (at 80° F. ambient temperature) and a 25 per cent thermal efficiency, based on the lower heating value of fuel. Compared to the fuel requirements of gas-engine-driven compressors available at that time (about 30 per cent thermal efficiency, depending on size and type), the turbine's economy was viewed with mixed emotions. Some industry members, sensing that installation, operating labor, and maintenance cost savings might overshadow increased fuel cost, were favorably impressed. Others believed that fuel requirements, even at the expense of greater over-all operating costs, should be held to a minimum, thus insuring a less rapid depletion of reserves.

Completion . . . At any rate, the introduction of gas turbines to pipelines has apparently helped the transmission industry as a whole, due to the element of competition. Supercharged two and four-cycle engines are now available in larger sizes than previously, and with thermal efficiencies averaging about 35 per cent, or roughly a 10 per cent improvement. Pipeline gas turbines recently (October 1953) enjoyed a 10 per cent reduction in fuel requirements also, and are offered at 27.5 per cent thermal efficiency. The cost of fuel gas has continually risen and occupies roughly 30 per cent of combined operation and maintenance costs. It is fundamental that any further increase in fuel economy of prime movers—whether existing and in operation, or yet to be purchased—will be invaluable to the transmission companies. On the basis of the above analysis, it is probable that some reticence to purchasing gas turbines exists due to the continued superiority in fuel consumption of compressor engines.

First installations . . . Until 1947, a centrifugal compressor did not exist on a gas-transmission pipeline in this country. One of the first installations consisted of three 2,000-hp. motor-driven centrifugal compressors arranged in series, and were located on the T.G.T. system at Station 110, Morehead, Ky. Mainline pipe was in short supply at that time and the station was constructed as an expedient in meeting contract demands for gas. The installation still remains, and is located on the same land tract as the gas-turbine station. Large-scale use of centrifugal machines commenced about the same time when Texas Eastern Transmission Corp. acquired the Big Inch and Little Inch lines, and replaced the motor-driven pumps with compressors.

Performance . . . To this day, a general feeling still persists in some transmission companies that centrifugal compressors do not match pipeline requirements. This is probably due to a misunderstanding concerning the machine's characteristics. It is virtually impossible to discuss centrifugal capabilities without referring to curves, and certain study is required to understand them. Thus, it has been apparent that any manufacturer attempting to explain and sell gas turbines has of necessity been required to do likewise with the centrifugal compressors which they drive.

ELECTRIC LOGGING—31

Effects of Interbedded Shale

by R. I. Martin

SANDS occurring in nature are seldom completely clean, so that it is necessary to consider the effects of clay particles. This clay may be present in the form of regular or irregular layers, or may be disseminated throughout the sand. It will be easier to make this analysis by first considering the regular layers. Such a succession of interbedded sand and clay layers may be referred to conveniently as a sandwich.

Fig. 1 shows such a case. Here the bed thickness is constant and the clay is present in amounts 0, 25, 50, and 75 per cent, from top to bottom. In all cases the layers of sand and clay are of equal thickness, but the absolute value of the thickness of the sand layers is shown for three cases equal to d/4, d/2, and d. The effects on the computed S.P. curves are very evident. Three points of interest are:

1. On the thick sandwiches shown, the average deflection is approximately proportional to the amount of sand present.

2. The average contour corresponding to a sandwich of finite thickness is the same as for a homogeneous sand of the same thickness, but for which the total e.m.f. would apparently be smaller.

(3) The amplitude of the ripples around the edge of the average curve decreases very quickly with decreasing thickness of the individual beds so that the ripples are scarcely noticeable when the individual thickness is less than d/2.

The following properties, not illustrated, may be mentioned:

1. The amplitude of the ripples decreases when the permeable beds are invaded by the mud filtrate.

2. The average amplitude of the peaks decreases when the resistivity of the sand increases with respect to that of the shales.

The second point is of particular interest, when one section is oil bearing and another is wet.

Whether the clay is stratified or not, the effect is similar on the log, provided that the shaly sand remains permeable. In unstratified shaly sands, the shale particles which are entirely surrounded by the mud filtrate or by the original connate water, generate no S.P. currents. When, however, a particle is in contact with mud filtrate on one side and connate water on the other an S.P. current will be formed. The total of the S.P. currents generated around each particle add their effects. Therefore the corresponding S.P. log is identical to one which would have been obtained if the same amount of shale contact had been present in the form of their interbedded shale streaks.

In other words, the amplitude of the S.P. peak does not depend on how the clay is present, provided that the average distribution is uniform. The amplitude is a maximum for a clean sand, and is reduced with increasing percentage of clay material.

If there is a progressive change in the nature of the fluid, going from mud filtrate to interstitial water, the result is still the same as for a stratified shaly sand. In that case there can be no particles simultaneously in contact with the mud filtrate and connate water. There are, however, a very large number of shale particles, parts of whose surfaces are in contact with water of varying salinities. Each particle generates a small e.m.f., but because there are so many more particles involved, the effect of the total S.P. current generated by all of them is the same, and the effect on the S.P. log is unchanged.

When the sand and shale layers are very thin it is often impossible to recognize them. The S.P. log of a shaly sand in which the proportions of sand and shale are constant throughout is identical with the S.P. curve for a clean sand giving an apparently lower e.m.f.—as, for example, a clean sand of lower salinity.

This lower e.m.f., which would give the same S.P. curve for a clean sand, is known as the "psuedo static S.P." The psuedo static S.P. represents the maximum possible deflection for such shaly sand, and can be attained only if the shaly sand is thick enough.

The psuedo static S.P. of a shaly sand is not only a function of the shale content, but is influenced to a large extent by the relative resistivities of the sand and shale. Partial oil saturation will increase the resistivity of the sand. It can be shown that this increase will lower the psuedo static S.P. Accordingly, the amplitude of the deflection on the S.P. log can be expected to be smaller opposite an oil-bearing section than opposite a water-bearing section. Such a change in the deflection of the curves can only be found for shaly sands or for thin sands; it will not occur for thick clean sands.

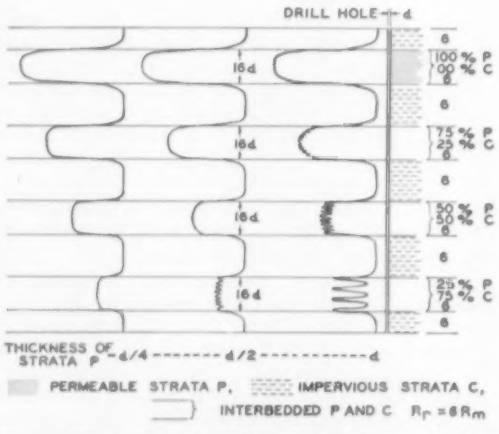
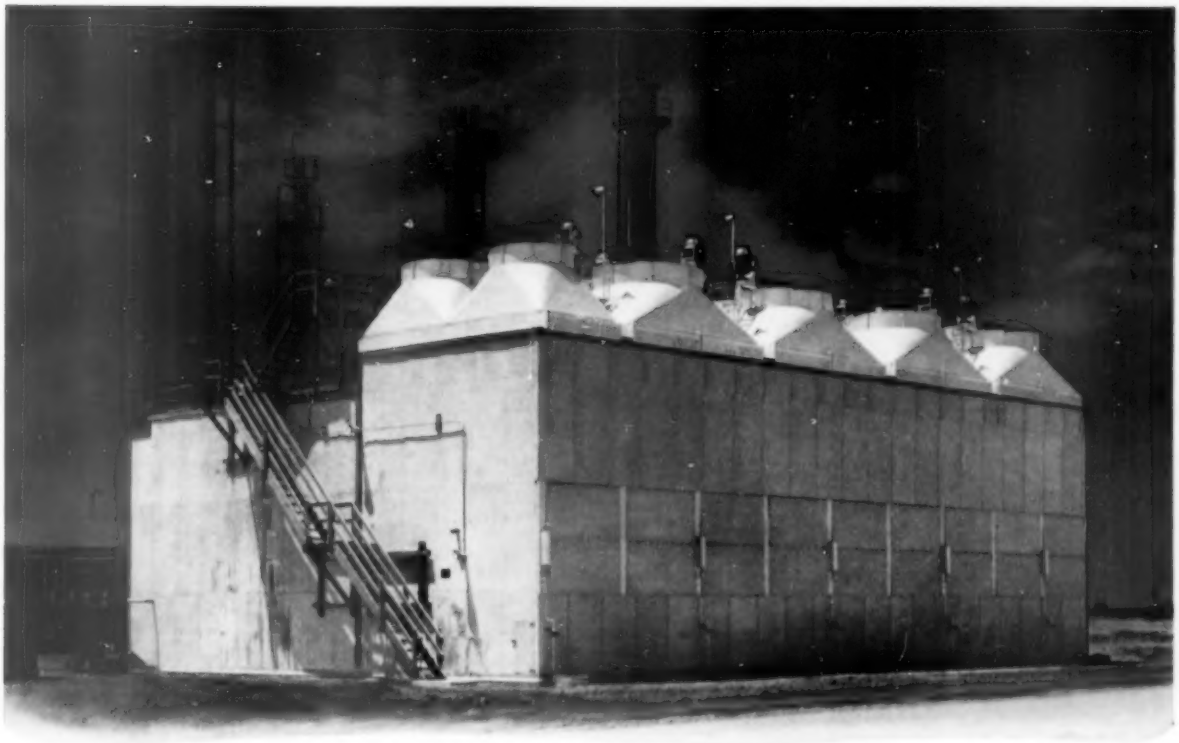


Fig. 1—Effects of interbedded shale on the computed S.P. curves. From H. G. Doll, "The S.P. Log: Theoretical Analysis and Principles of Interpretation." A.I.M.E. T.P. 2463, September 1948, page 21.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.



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The COMBIN-AIRE is a combination of a comparatively small Hudson water cooling tower with Hudson SOLO-AIRE hot fluid to air exchangers housed in one integral structure. In hot weather air to be used for cooling is reduced to near wet bulb temperature by contact with water near the bottom of the cooling tower. The cooled air is then used for cooling in the SOLO-AIRE units.

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1. **MINIMUM WATER REQUIRED.** No water used in cold weather. No loss from spray or carryover.
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3. **MINIMUM PIPING.** Absence of carryover or condensation allows installation adjacent to other equipment. Auxiliary shell and tube sub-coolers unnecessary.
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The COMBIN-AIRE unit is protected by United States patents

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COMBIN-AIRE UNITS

By combining in one structure Solo-aire units with a cooling tower, HUDSON originated the Combin-aire unit. In hot weather, air before use in the Solo-aire units, is contacted with water to reduce both air and water temperature. In cold weather, water use is unnecessary. This device makes possible the use of air for low temperature cooling, allows use of untreated water, minimizes water consumption, and results in capital and operating savings.

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Low-Alloy Steels, Primarily for High-Strength Services

by W. L. Nelson
Technical Editor

THE uses of metals for services that are somewhat unusual to the refining industry have already been discussed on Progress in Metals pages—high-temperature oxidation (February 2, May 25, and July 20, 1953), high-temperature strength (March 30, April 27, May 25, and July 20, 1953), sulfide corrosion (March 2, May 25, and August 17, 1953), low-temperature ductility (April 12, 1954, p. 163), and "acid" corrosion (May 10, 1954, p. 181). The meeting of these special conditions is so difficult that lesser requirements such as the strength, hardness, abrasion resistance, etc., of machinery or structural steels, attract little attention. Furthermore, the structural and machine services encountered in refineries are not greatly different from those in other industries, unless the special services enumerated above are involved.

Although there are literally dozens of low-alloy steels, only the somewhat standard steels can be indicated here. These steels (Table 1) are the S.A.E. or A.I.S.I. steels widely represented by four-digit numbers, the first number indicating the kinds of alloy elements (1 meaning plain carbon, 2 nickel, 3 nickel and chromium, etc.), the second number the composition or amount of alloy element (but not usually the numerical amount), and the last two digits showing the hundredths of a per cent of carbon. Thus, a 4340 steel is classed as a molybdenum steel that contains (see Table 1) 0.25 per cent of Mo, 1.8 per cent Ni, and 0.8 per cent Cr, and it contains about 0.40 per cent carbon. Table 1 is not complete with respect to minor alloy elements or various modifications of analyses, nor does it list all steels that have at times been numbered in this general manner.

Nickel is the only commonly used element that enters (dissolves in) the iron or ferrite part of steel, whereas other elements such as chromium, molybdenum, vanadium, etc., primarily affect the dispersion of the hard iron carbide (cementite) that gives steel its strength, brittleness, and hardness. Thus, nickel generally tends to improve the ductility, impact, or toughness properties whereas the other elements, if used alone, without nickel or extra manganese, tend to cause great strength and hardness but also to impart brittleness. Manganese and copper have somewhat the same effect as nickel in imparting ductility or stabilizing the carbides, but in a lesser degree. Scarcely any superiority in corrosion resistance is noted in the law-alloy steels, and nickel and molybdenum may even harm the high-temperature oxidation (rusting) resistance. Upon exposure at 1,200° F., for 10,000 hours, some of the common low-alloy steels (annealed) lose weight as follows:

		Per cent
S.A.E. 3316	Ni-Cr	9.4
S.A.E. 4815	Ni-Mo	12.7
S.A.E. 8624	Ni-Cr-Mo	29.5
S.A.E. 4640	Ni-Mo	42.4

During the heating, the steels lost some of their strength but their impact strength was not impaired and in some instances was improved. The 2320 and 4640 steels tend to graphitize upon exposure at 1,050° F.

The lowest-alloy steels are used for pipelines, structures, tank or tanker plate, etc., such as Cromansil (0.5 Cr, 1.2 Mn, 0.75 Si), but occasionally the higher-alloy steel 2335 (3.5 per cent Ni) is used for its great strength or toughness. Steels containing 0.35-0.5 per cent carbon can be greatly strengthened by heat treatment (quenching and tempering). Thus, oil-quenched 4340 steel develops upon temperating, the following approximate properties:

Tempering temp. (°F.)	Yield point, psi.	Elongation (%) in 2-in.	Brinell hardness
400	255,000	10	540
600	235,000	11	500
800	200,000	12	445
1,000	160,000	15	375
1,200	130,000	19	*305

*Jaws of wrenches do not take hold if hardness much exceeds 300.

Although similar behaviors are exhibited by most of the low-alloy steels, particular service applications have been developed for the various low-alloy steels such as those that will be tabulated in the next (July 5, 1954) issue of the Progress in Metals page.

The low-alloy steels of low-carbon content (0.15-0.2 per cent) are also widely used in the carburized and case hardened condition for parts that are exposed to conditions of severe wear. Examples of conditions of extreme wear are certain pins, pump rods, cotters, chain links or bushings, bearings, and valve seats.

TABLE 1—INDICATION OF THE COMPOSITION OF WROUGHT LOW ALLOY STEELS FOR THE PURPOSE OF INDICATING A WIDELY USED METHOD OF NUMBERING*

Steels—	No.*	Ni	Cr	Mo	Carbon	Approx. cost (bars) relative to carbon steel
Carbon	10xx	....	....	....	0.06-0.95	1.0
Manganese	13xx	(1.6-1.9 Mn)		....	0.18-0.43	....
Nickel	‡21xx	1.5	....	....	0.10-0.20	1.27
	23xx	3.5	....	....	0.15-0.48	1.56
	25xx	5.0	....	....	0.09-0.20	1.80
Ni—Cr	31xx	1.25	0.65	....	0.13-0.43	1.25
	31xx	1.25	0.8	....	0.38-0.53	1.25
	†32xx	1.75	1.1	....	0.1 -0.55	....
	33xx	3.5	1.6	....	0.08-0.19	2.36
Molybdenum	40xx	....	....	0.25	0.15-0.70	....
Cr—Mo	4118	....	0.5	0.11	0.18-0.23	1.18
	41xx	....	0.9	0.21	0.28-0.53	....
Ni—Cr—Mo	43xx	1.8	0.5	0.25	0.15-0.22	....
	43xx	1.8	0.8	0.25	0.35-0.43	1.66
Ni—Mo	4608	1.6	....	0.20	0.06-0.11	....
	46xx	1.8	....	0.24	0.13-0.43	1.39
Ni—Mo	48xx	3.5	....	0.25	0.10-0.23	1.72
Chromium	5045	....	0.65	....	0.43-0.48	....
	5046	....	0.25	....	0.43-0.50	....
	51xx	....	0.8-1.1†	....	0.15-0.65	....
Cr—Va	61xx	....	0.8	(0.1 Va mini.)	0.15-0.22	....
	61xx	....	1.0	(0.15 Va mini.)	0.43-0.53	1.43
Ni—Cr—Mo	86xx	0.55	0.5	0.2	0.15-0.6	....
	87xx	0.55	0.5	0.25	0.13-0.53	....
Silicon	92xx	....	(2 Si)	....	0.5 -0.65	....
Silicon chromium	9261	....	(2 Si)	0.17	0.55-0.65	....
	9262	....	(2 Si)	0.35	0.55-0.65	....

*General illustration of number systems of the S.A.E. and A.I.S.I. †Varies from 0.7-0.9 to 0.9-1.2. ‡Obsolete number.

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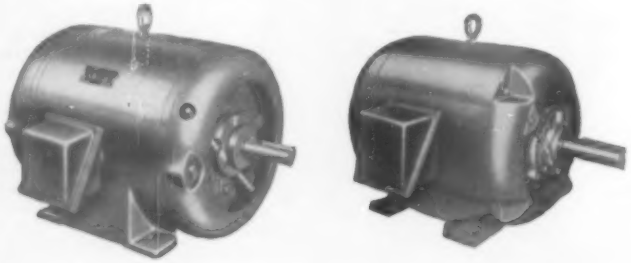

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M54-16

Oxidation Stability of Jet Fuels—1

by J. W. Thompson

THIS series in the Refiner's Notebook presents the results of studies of the oxidation stability of jet fuels by means of accelerated aging tests. Such information is valuable in being indicative of the stability of the fuels during storage, when atmospheric oxidation can cause deterioration.

Summary . . . Results obtained by accelerated oxidation tests reported here indicate that uninhibited jet fuels vary widely in stability. Of the four fuels studied, the two prepared from straightrun components met the military-specification requirement, but the others, which contained cracked products, did not. Certain antioxidants were found to be effective in stabilizing jet fuels to the degree required by current military specifications, though with highly unstable fuels the concentration of inhibitor required exceeded the permissible limit.

Antioxidants were found to vary widely in potency in jet fuel. The five studied were rated in the following order of decreasing effectiveness: p-butylaminophenol; N,N'-di-sec-butyl-p-phenylenediamine; butylated 4-methoxyphenol; 2,6-di-tert-butyl-p-cresol; and 2,2'-methylenebis (6-tert-butyl-p-cresol).

Accelerated gum . . . Reasonably good correlation was observed between accelerated gum and induction-period methods of rating antioxidants in unstable jet fuels. A comparison of air and steam evaporation methods for determination of the soluble gum portion of accelerated gum indicated that the steam method gave better agreement of antioxidant ratings averaged at different gum levels and in different fuels. Steam-jet gum values were found to be much lower consistently than air-jet gum values. In the fuels studied, insoluble precipitate constituted only a minor fraction of the accelerated gum values, even at high gum levels.

Author is with research laboratories, Tennessee Eastman Co., division of Eastman Kodak Co., Kingsport, Tenn.

Dissolved copper . . . This was found to be harmful to jet fuel in both the presence and absence of antioxidants. However, copper could be deactivated effectively by N,N'-disalicylidene-1,2-propanediamine, a deactivator widely used in gasoline.

Military specs . . . The increasing use of various types of aircraft turbine engines indicates that jet fuels form an important part of the future petroleum picture. At present, the Military Services are the largest users of such fuels, and the properties of the several grades in use are governed by military specifications. The most recent of these specifications is for Grade JP-5, as outlined in MIL-F-7914 (AER), dated March 11, 1952. Some of the factors involved in establishing specifications for satisfactory jet fuels, military as well as civilian, have been discussed by several authors.[1,2,3] The current status of all military specifications which have been issued to date is indicated in a recent article.[4]

Stability . . . Adequate stability against oxidative deterioration resulting from contact with air during storage is an important requirement for jet fuels. Instability is evidenced by formation of both soluble gum and insoluble gum. Such oxidation products are harmful in that they may cause plugging of engine fuel lines, filter screens, fuel nozzles, and related equipment. The degree of stability is influenced by fuel composition. Thus, jet fuels prepared from straightrun materials are considered to be relatively stable, but if cracked components are included, the fuels may be less stable. Although present jet fuels are essentially of straightrun character, large-scale blending with cracked stocks might be necessary in times of emergency.[4] Thus, jet-fuel stability could become an important problem.

Blended fuels . . . Jet fuels can be blended from a wide variety of petroleum products prepared by various processes. These components may include conventional cracked gasolines as well as distillate fuel fractions. The extreme instability of some gasolines is well known, and effective additives and test procedures are in use to control it. The stability characteristics of higher-boiling petroleum fuels are receiving increased attention, as indicated by the recent interest in this property of domestic fuel oil.

Existent gum . . . Military specifications for jet fuel include two distinct requirements concerning gum concentration and oxidation stability. One of these concerns "existent gum," which is a measure of the fuel condition at the time of test, and the other related to "potential gum" or storage stability. Existent gum is the amount of nonvolatile residue in the fuel as measured by the air evaporation method at 400° F. The specifications limit the allowable amount of existent gum to 10 mg./100 ml. of fuel.

Accelerated gum . . . Storage stability characteristics are evaluated by an accelerated oxidation procedure called the "accelerated gum" test. This test involves aging a sample of the fuel for 16 hours in a bomb at 212° F. under oxygen at 100 psi. and subsequent determination of the amounts of "insoluble gum" and "soluble gum" that are present. The sum of these amounts is termed "accelerated gum." The insoluble gum is that material which is collected in a fine-porosity, sintered-glass crucible and which is insoluble in a mixture of acetone and benzene. Soluble gum is the nonvolatile residue obtained by evaporation of the filtered, oxidized sample under the conditions of the existent gum test.

The specifications require that the accelerated gum content shall not exceed 20 mg. per 100 ml. of fuel. In order for jet fuels to meet these stability requirements, the specifications provide for the addition of certain antioxidants. These antioxidants are hereafter referred to as "specification inhibitors."

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by J. F. Wilson

Low-Temperature Fractional Analysis—5

AS has been indicated in preceding installments, a majority of the work at the school was on a Podbielniak fully automatic analyzer with modifications introduced at the school. The school had only one sample of known composition available. The composition of this sample was as follows:

	Mole per cent
Propane	1.51
Isobutane	32.87
Normal butane	64.40
Isopentane	1.22

In order to speed up the analyses for instruction purposes, this was normally treated as a three-component mixture. The distillation was carried through the isobutane to normal butane break, and the remainder of the sample was flashed into the receiver system without distillation. This, of course, greatly decreased time required for an analysis.

Accuracy of analysis . . . On the modified automatic equipment the analytical results on propane were generally distributed within plus or minus 0.1 per cent of the known composition. The isobutane content determined by analysis was consistently below the synthesis value. Correspondingly, the normal butane plus fraction was generally determined somewhat higher than the synthesis value.

In the ninth and last class at the school, the average deviation from the synthesis value obtained from the analysis of this mixture was generally 0.2 per cent or less, although the systematic deviations mentioned above were present. Some analyses were also made on the Podbielniak semiautomatic apparatus and manual equipment. In general, the analytical precision on both the semiautomatic and manual equipment was less than that obtained on the fully automatic apparatus. This is understandable from the standpoint that an operator needs time to become familiar with the characteristics of a particular column, and school time could not be profitably spent toward this end.

Author is research engineer, Union Oil Co. of California. Paper presented at C.N.G.A. meeting.

Unfortunately, only one sample of known composition was available for study. It would have been desirable to ascertain experimentally that the automatic column was capable of similar accuracy on different types of samples. While there is no reason for suspecting it would not, experimental verification of this fact would have been satisfying.

School accomplishments . . . The school was successful through the establishment of sound calculating method and calibrating techniques, and through certain modifications in the method of reflux cooling to obtain results of a high order of accuracy from a Podbielniak automatic column. The average deviation from the true composition was of the order of 0.2 per cent per component. This accuracy was obtainable with a minimum of operator attention and apparently was not dependent on excessive maintenance or repairs on the apparatus. As a result of the findings at the school the next model of the Podbielniak automatic equipment will include a number of modifications. The final plans have not yet been made on all modifications, but a number of the innovations resulting from the school will be incorporated on the new equipment.

Some Problems

In spite of the fact that the school made great strides in improving the accuracy and convenience of the low temperature fractional distillation method for hydrocarbon analysis, there are still a number of unsolved problems. Certainly the ultimate accuracy inherent in the method has not yet been reached. Certain systematic deviations still remain such as the consistently low results obtained for isobutane and correspondingly high results obtained on normal butane in the sample studied at the school. Little is known about the best methods for the removal of water, carbon dioxide, and hydrogen sulfide before distillation. It is probable that the absorbents used to remove these components show some selectivity toward the hydrocarbon components of the sample, thus changing its composition, but little is known of the magnitude of this effect.

Although the majority of equipment in use throughout the country for low-temperature fractional distillation is furnished by Podbielniak, Inc., there are other types in use and the application of some of the principles found in the school to apparatus other than the Podbielniak equipment is not necessarily straightforward.

Liquid holdup . . . Although the school was successful in eliminating liquid holdup and accurately determining the extent of vapor holdup, the best solution of the holdup problem appears to be in finding some means of determining the composition of the distillate as it enters the receiver system; that is, either replacing or augmenting the dewpoint temperature measurement in the column with some measurement at or near the receiver system shutoff valve to indicate composition there. The most promising method of doing this seems to be the measurement of thermal conductivity of the gas. If a cut can be made when the composition change reaches the receiver shutoff valve, rather than when it reaches the measuring junction of the thermocouple, there are no holdup corrections of any type to apply. There is a problem at the present time in obtaining thermal conductivity measurements of sufficient sensitivity and stability for this purpose. However, there has been little work done, up to the present time, on the use of thermal conductivity in this particular application.

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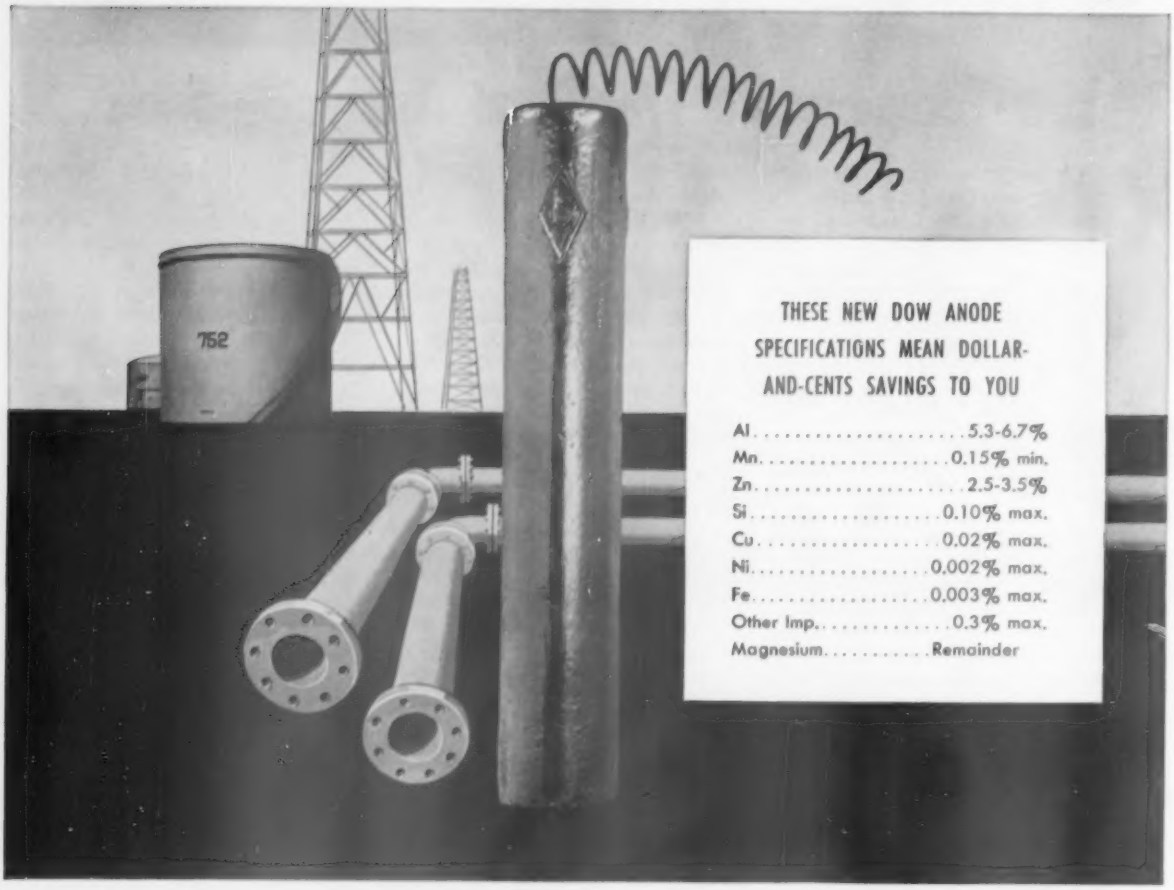

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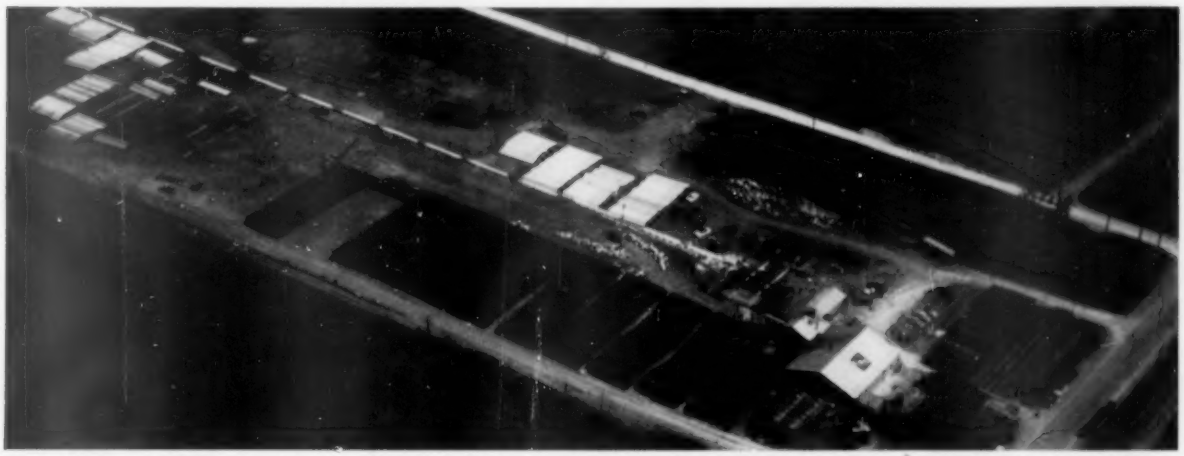
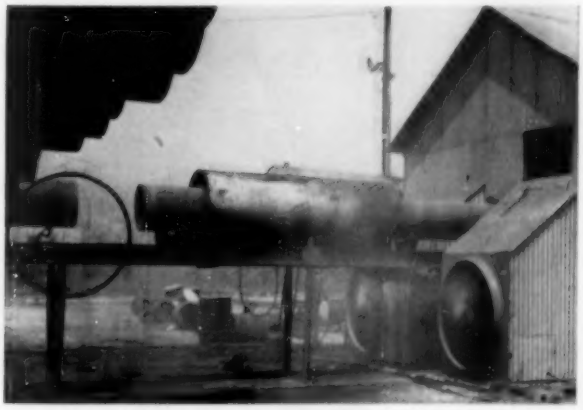


1 Aerial view of C-R-C automatic pipecoating yard. Note long line of pipe being moved by trolley to storage area. Yard can handle up to 3 miles of 20-in. pipe per day.

2 Pipe begins its journey through the automatic yard when it is unloaded from trucks onto inclined rack. From here pipe progresses down rack to cleaning equipment.



3 Trigger circled at left releases as joint passes and allows next joint to roll from inclined rack onto roller and into cleaning and priming equipment.

Yardcoating pipe on an automatic assembly line

by F. Lawrence Resen
Gulf Coast District Editor

AN automatic assembly line has been set up for the yard cleaning and wrapping of pipe at a Houston Ship Channel location. Equipment has been initially handling 20-in., 40-ft. joints, which feed through at the rate of 80 ft. per minute.

Automatic controls permit the pipe to be heated, wire-brushed, primed, coated, wrapped, end-cleaned and beveled, and whitewashed in one continuous operation.

Inclined racks and roller drives are utilized to move the pipe through the yard equipment. Thus, the pipe is initially placed on an inclined rack, then rolls onto a rack with a roller drive which feeds its endways into the cleaning equipment; it is discharged from this equipment onto another roller rack, carried to an inclined rack, and deposited thereon. In the next phase, a similar sequence follows; the pipe joints are rolled from the inclined rack onto a roller rack, then are driven endways into the coating and wrapping equipment and discharged onto another inclined rack.

Sequence . . . In a step-by-step sequence through the operation, the pipe is first loaded onto an inclined rack, which slopes ¾ in. per ft. This is sufficient to allow the pipe to gravity feed to a roller rack. Several joints are loaded onto the rack, with the foremost leaning against two air-operated restraining arms. These arms are actuated by a release mechanism set in motion by the passage of the pipe joint immediately preceding the one on the rack.

The release mechanism is spring loaded and held down by the pipe joint passing over it. Once the end of the joint clears the mechanism, it is released and actuates the air feed into rams which cause the restraining arms to be retracted, allowing one joint of pipe on the inclined rack to roll onto the roller rack. The shaft-driven rollers on this rack drive the pipe endways

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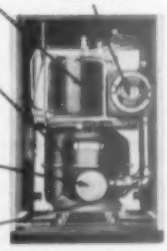

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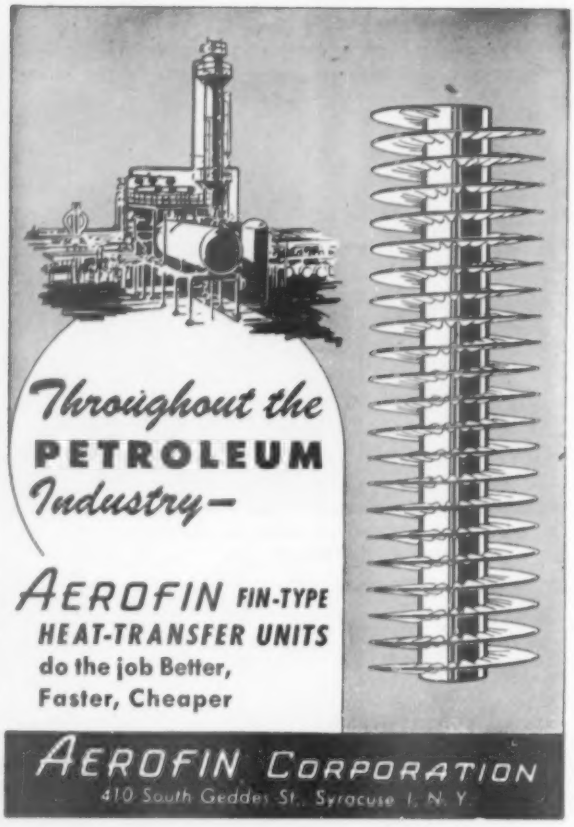

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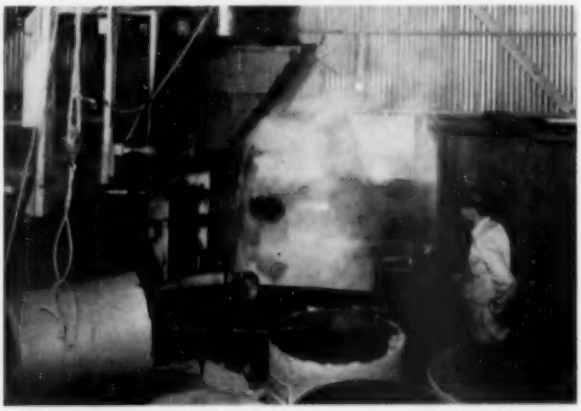
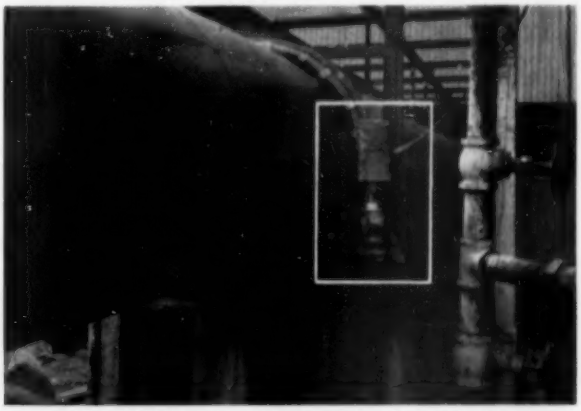
4 Roller drives move the pipe endways into the coating machine. Air-operated arm (circled) releases to allow joint to move onto roller rack.



5 Pipe is coated and wrapped in this step. Temperature of enamel is thermostatically controlled. Next step is cooling by a water-spray bath.

6 Water for spraying coated and wrapped pipe is circulated through this cooling tower mounted above spray tank. Coating is quickly cooled to prevent damage in later handling.



7 Automatic holiday detecting and marking is done by this aerosol bomb filled with aluminum paint. Marked joints are culled for further handling.

through a burner and into the wire-brush and primer unit. Speed of the shaft-driven unit is such as to cause the individual joint to catch up to the preceding joint as it passes through cleaning and priming equipment; however, there is enough natural slippage so there is no excess load on the unit.

Heating . . . Purpose of the burner is to heat the pipe so that when the primer is applied, it will dry rapidly and be in shape for the next operation. In the cleaning process two 150-hp. diesel engines are used to drive counter-rotating wire brushes, to insure proper cleaning of the pipe seams. Immediately following the wire-brushing, the pipe is primed, and then discharged from this particular phase onto a roller rack.

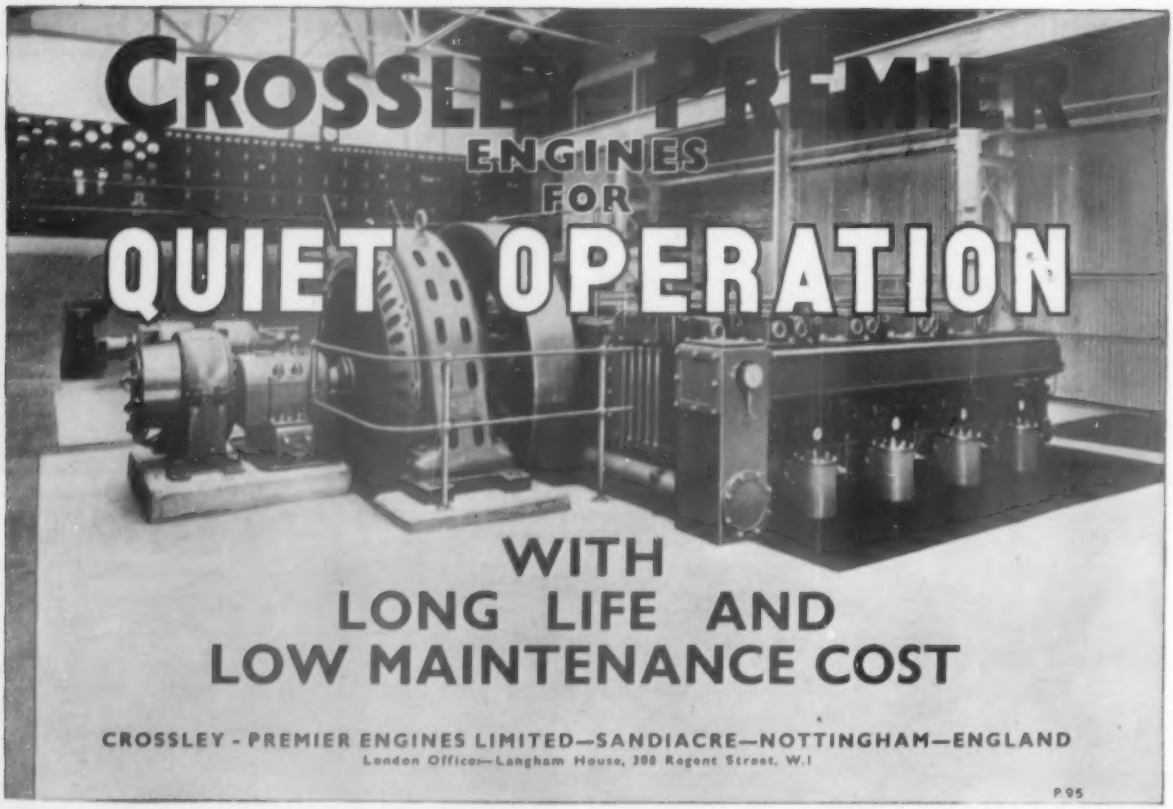
The joint travels in an axial direction along the rack, being pushed by the joint leaving the priming machine, until it hits a trigger mechanism, whereupon it is lifted forward and upward and deposited on another inclined rack. Again, air-operated rams are used to move the pipe. Purpose of lifting it forward is to pull it away from the following joint so it will be free to roll onto the inclined rack.

It takes the joint approximately 30 minutes to work its way from one end of this inclined rack to the other, which provides a drying period for the primer. Upon reaching the end of the rack, it again rests against restraining arms, which are air operated to release the joint and allow it to roll onto another roller rack. In this instance, the rollers are belt driven, and drive the pipe into the coating and wrapping machine. Again, however, they speed up its movement so that it enters the equipment immediately following the preceding joint.

Cooling . . . Upon leaving the coating and wrapping machine, the joint passes through a water-spray bath which cools the joint in a matter of seconds, permitting it to be easily handled. Water for this operation is circulated through an air-cooling tower at a rate of 500 g.p.m. The tower is mounted directly above the spray tank, with suction taken off the bottom of the tank. An interesting feature at this point is the use of automobile wheels and tires to support the pipe in its axial movement.

Two wheels are mounted at 8-ft. intervals, slightly inclined towards each other at the top, thus providing a cradle for the pipe. The tires are inflated to a pressure of 5 psi. each and gently support the coated pipe. While passing through the spray tank, the pipe is being driven by the coating and wrapping machine, and thus the wheels serve as idlers. However, at a later step in the operation, the wheels are belt-driven, to move the pipe through the yard as desired.

Holidays . . . As the pipe leaves the spray tank, it passes through a holiday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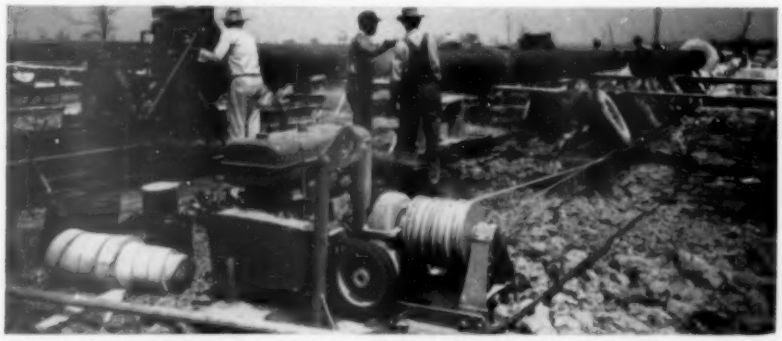

8 After leaving spray chamber, pipe rolls down inclined rack to end cleaners which cut-back and scarf the coating on the ends of each joint.

9 Pipe then travels on rollers to whitewash machine. Air-operated lifts raise roller rack to allow pipe to clear cross rails.

10 Amount of pipe handled is automatically counted as pipe travels down 1,500-ft. rubber-tired trolley to convenient loading point.

detector, which is connected through a simple solenoid arrangement to an aerosol bomb containing aluminum paint. When a holiday is discovered by the unit, the solenoid is energized and a streak of aluminum paint applied to the pipe. This, then, can be quickly spotted and segregated for further handling. The pipe continues to move out of the spray tank until a trigger mechanism is reached, which actuates air-operated rams which lift the pipe forward and upward and deposits it upon another inclined rack.

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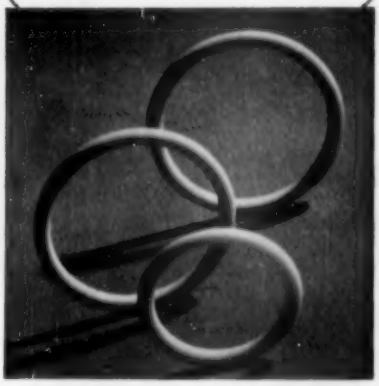

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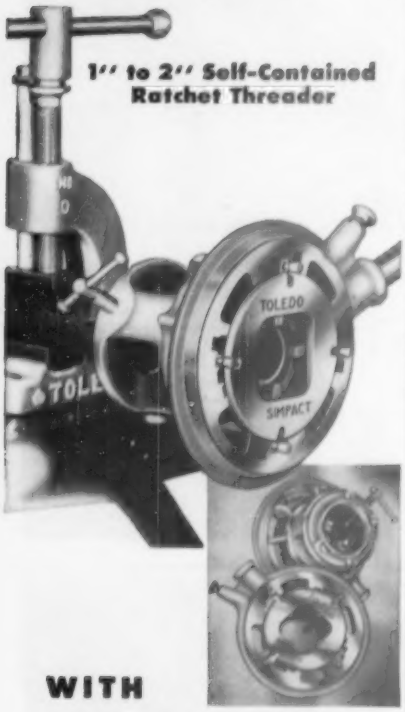

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PIPELINE PATROL

The joint rolls down this rack to rest upon cradles mounted on vertical airlifts. These serve to raise the joint above the rack, whereupon two end cleaners move into position to clean 5 in. of either end of the pipe for field welding purposes, and at the same time bevel the end of the coating. The ends of the joint are then primed, and rolled to a point in line with a continuous trolley made up of mounted wheels.

Unloading . . . The trolley in use at the present time extends 1,500 ft. into the yard so that the pipe can be unloaded at any spot on either side of the trolley as desired. The trolley will eventually be extended to a total of 2,600 ft. so the pipe may then be unloaded directly onto a barge, if desired. The tires on one side of the trolley are driven by means of an endless cable traveling against the bottom side of each tire, with the ones on the other side serving as idlers.

In order to start a joint on its way along the lengthy trolley, it is first necessary to clear the two runners of the inclined ramp which it has been rolling. This is accomplished by mounting the initial tire-trolley group on two airlifts, and positioning them beneath the ramp. The joint first rolls into position above the tire trolley, which is in a depressed position below the level of the ramp. However, once air is applied, the trolley is raised and lifts the joint above the level of the ramp, while the continuous movement of the endless belt serves to drive the joint on its way along the main trolley.

In a final step, the joint passes through a whitewashing machine, which coats it to offset the effects of the sun's rays on an otherwise dark surface. A counter is set up following the machine to register the number of joints and feet of pipe coated per shift.

The initial work conducted at the yardsite was the preparation of 156 miles of 20-in. pipe for Magnolia Pipe Line Co. for use on the Beaumont-Corsicana, Tex., crude-oil line. Of this total, 100 miles will be cleaned and primed, while 56 miles will be coated and wrapped.

C-R-C has been experimenting with this equipment for a number of years and was the first company to develop a completely automatic yard. The permanent installation is situated near the A. O. Smith pipe mill on the Houston Ship Channel. The coated pipe can be loaded onto trucks, railroad cars, or barges for shipment to the construction site.

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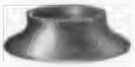

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REFINING

New Catalyst Ready

RD-150, Sinclair-Baker discovery, being made

NEW YORK. — Baker & Co., Inc., is commencing production of RD-150, the new platinum reforming catalyst developed jointly with Sinclair Research Laboratories, Inc. The new catalyst plant, located at Newark, N. J., is expected to be in full operation in June.

Catalyst stocks will be built up to provide initial charges for three new Sinclair-Baker reforming units now building. The first of these will be Pure Oil Co.'s 3,000-bbl. per day unit at the Heath refinery, Newark, Ohio. Pure's unit is due to come on stream by late June or early July. Sinclair Refining Co. will follow in September with a 16,000-bbl. per day unit at Marcus Hook, Pa., and a second Sinclair unit of similar size is scheduled for completion early next year at its East Chicago refinery.

Baker & Co., major platinum producers, foresee an adequate supply of the precious metal despite exceptional demand which has resulted from the refining industry's acceptance of platinum as a reforming catalyst. One of the principal sources is the refining of nickel, which produces platinum as a byproduct. Fortunately the current boom in nickel has provided substantial quantities of platinum to meet the large initial requirements of new catalytic reforming units which are going on stream nearly every week.

In the long run, it is possible that the replacement costs of platinum catalyst may be lowered as more efficient facilities are installed to recover the metal from spent reforming catalyst. The new market created by refiners will probably continue to represent a major outlet for platinum manufacturers as reforming capacity increases throughout the world.

By the end of this year, it is estimated that U. S. refiners will have invested $11,000,000 in platinum alone. This investment represents the major portion of the cost of the catalyst operating in reformers. Six different types of platinum catalyst are used in various fixed-bed processes.

Three Companies Announce Plans to Build Terminals

HOUSTON.—Continental Oil Co., Skelly Oil Co., and Mid-Continent Petroleum Corp. will join together to build products terminals at Amboy, Ill., and Madison, Wis.

Continental will supervise construction on the $1,330,000 terminals which will commence immediately. The terminal at Amboy will be completed in September and the one at Madison in December.

Continental, which will operate the terminals, and the other two companies will receive products from Oklahoma

NELSON REFINERY CONSTRUCTION INDEX

Appears on the Refining page in the first issue each month.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.

The Index was explained July 7, 1952 (p. 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

INDEX (1946 = 100)

	1948	1950	1951	1952	1953	Feb. 1954
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.1
Electrical machinery	127.6	134.9	154.3	152.4	156.4	160.7
Internal combustion engines	116.9	126.0	146.1	146.5	148.1	150.6
Instruments	120.0	127.8	142.3	146.2	151.8	154.0
Heat exchangers	130.0	140.0	152.0	165.8	174.9	179.0
Miscellaneous equipment average	*122.1	*126.2	*145.1	153.3	158.8	162.1
Materials component	139.3	149.5	164.0	164.3	172.4	173.6
Labor component	128.0	144.0	152.5	163.1	174.2	180.0
Refinery Construction Index	132.5	146.2	157.2	163.6	173.5	177.4

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the miscellaneous equipment items shown above.

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Esso Expanding

$64 million to be spent on refinery facilities in '54

NEW YORK.—Esso Standard Oil Co. will spend $64,000,000 on refining this year, most of it earmarked for expansion of its East Coast refineries.

At the 62,000-bbl. per day Baltimore refinery, a 10,000-bbl. per day fluid coking unit is under way. This is the first modern coking unit in any East Coast refinery, and will be the second unit using the fluid technique, to go on stream.

Also at Baltimore, a 3,000-bbl. per day, fixed-bed hydroforming unit using a platinum catalyst, is planned. Three hydrofining units are building. The largest is a 12,000-bbl. per day plant which will be used to upgrade light virgin, light coker, and heavy cracked naphthas. A 3,000-bbl. per day unit will charge heavy virgin naphtha and a 5,000-bbl. per day unit will upgrade heavy cracked heating oil.

The Bayway refinery, Linden, N. J., will have a new polymerization unit, outdoor alcohol-finishing facilities, and 650,000 bbl. in added storage, the latter alone costing about $3 million. New gasoline blending facilities and a crude-oil blending project will cost $2 million each.

At Baton Rouge where a major plant expansion program was completed under previous construction programs, most of the new work is directed toward improving chemical operations. A new isopropyl alcohol finishing unit and a $12 million project calling for two hydrofiners, comprise the current program. One 26,200-bbl. per day hydrofining unit will hydrogenate virgin gas oil and a second, 12,740-bbl. per day unit will upgrade coker gas oil and naphtha.

Bayway's new hydrofiners and a three-stage crude distillation unit were included under last year's expenditure quota and are now nearing completion. Everett, Mass., also completed a major expansion and modernization program. This year, the emphasis is on greater plant efficiency and higher product quality, with little or no outright expansion in crude charging capacity in any of Esso's six refineries.

New Grades of Catalyst Ready for Fluid Cracking

NEW YORK.—American Cyanamid Co. has announced the development of three grades of microspheroidal fluid cracking catalyst. Beginning June 1, refiners will have their choice of light, intermediate, and narrow grades of Aerocat MS. The light grade (50/60) is designed for fluid units operating at low velocities with exceptionally good catalyst recovery facilities. Units with average recovery equipment, operated at moderate to low velocities, will take the intermediate Grade, 60/70. Grade 75/85, or narrow, is best suited to units with highest velocities with limited recovery equipment.

Gulf Awards Contract

PITTSBURGH.—Gulf Refining Co. has awarded Procon, Inc., of Des Plaines, Ill., a contract to build a 10,000 bbl. Platformer at Gulf's Cleves, Ohio, refinery.

The Procon expects to begin clearing ground early in June and to start construction of the unit in July.

The work, to be completed by April 1955, is part of Gulf's $250,000,000 capital expenditure program for this year.

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Among the

Drilling Contractors

A. W. Eggleston is drilling under contract on Southern Mineral Corp.'s third test in the new shallow producing area opened by the latter company early this year southeast of Eunice, in Acadia Parish, Louisiana. The new test, 3 Frey, is contracted to 4,500 ft.

Appell Drilling Co., Alice, Tex., is under contract for a 6,500-ft. wildcat test to be drilled for W. Stewart Boyle, of Houston, in western San Petricio County, South Texas. Location is on the operator's Poole lease, 9 miles southeast of Mathis.

Mustang Drilling Corp., Tyler, Tex., is drilling on a new wildcat operation, 1 Banks estate, in L. Rhodes Survey, 4 miles southwest of New Salem, in Cherokee County, East Texas. The test is a partnership deal with T. G. Shaw and John R. Bunn. Location is 1 mile southwest of Lone Star field. Hole is projected to 4,200 ft.

Loffland Brothers Co., Tulsa, has been given contracts by Cities Service Oil Co. for two more deep wells in the multiple-pay Bourg field, in Terrebonne and Lafourche Parishes, Coastal Louisiana. Both wells, 2 Delta Securities 9-P and 3 Guidry 7-P, are contracted for 11,800 ft.

Brewster-Bartle Drilling Co., Houston, is contractor and joint operator with C. B. Claypool and H. E. Dishman on a projected 9,400-ft. test being started in East Galveston Bay, Galveston County, Texas. Location, in State Tract 177, is about 2 miles southwest of Robinson Lake field.

San Juan Drilling Co. has contracted for two additional 3,500-ft. wells El Paso Natural Gas Co., is scheduled to drill on its Shell-State lease on the west side of the Eunice-Monument field, in Lea County, New Mexico. The new operations are Nos. 5 and 6, in 2-21s-36e and 32-20s-37e, respectively.

Norwood Drilling Co., Wichita Falls, Tex., is scheduled for another 13,600-ft. Devonian test to be drilled on Continental Oil Co.'s Anderson Ranch Unit, in Lea County, New Mexico. The new operation is No. 14, located in 2-16s-32e.

Parker Drilling Co., Tulsa, is under contract to N. H. Hunt for a projected 14,500-ft. Devonian test to be drilled 10 miles northwest of Lovington, in Lea County, New Mexico. Location, in 11-15s-34e, is in rank wildcat area, 6 miles east of Saunders field. The test is designated as 1 State of New Mexico.

Great Western Drilling Co., Midland, Tex., is undertaking two additional 10,000-ft. drilling operations for its associated company, Great Western Production, Inc., in Lazy "J" field, Lea County, New Mexico. The new wells are Nos. 1 and 2 State "An" 27, in 27-13s-33e.

Vernon Whiteley Drilling Co., Tyler, Tex., has a new wildcat operation under way in Anderson County, East Texas. Drilling is being done under contract for Christie, Mitchell & Christie. Location is for 1 Langston, in the W. T. Saddler Survey, 3 miles south of Slucum. Hole is contracted to 6,000 ft.

Weaver Drilling Co., Houston, is scheduled to drill a 7,500-ft. test in the Lovell's Lake area, Jefferson County, Texas Gulf Coast, for the account of Carnes W. Weaver, one of the contracting company's owners, and Hurt Oil Co., Ltd. The test is designated as 1 Nona Mills with location in C. Hillebrandt Survey.

Butler-Johnson Service Corp., Shreveport, has a rig working on a projected 7,300-ft. wildcat operation 3½ miles south of Nordheim, in DeWitt County, South Texas. The test, 1 Baumann, is for J. R. Butler, co-owner of the contracting company.

Atlas Drilling Co., Carmi, Ill., is starting another 10,500-ft. well for Atlantic Refining Co., in Baton Rouge field, southeast of Baton Rouge, in East Baton Rouge Parish, Louisiana. The new operation, 1 Gladden, is Atlantic's fifth in the field, discovered about a year ago.

T-W Drilling Co., Houston, is scheduled to drill a 14,000-ft. test for Royalite Oil Co., on the northwest side of the Deep Lake multiple-pay gas-conden-

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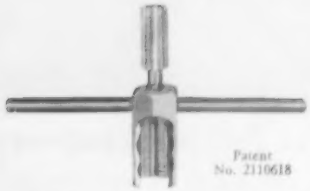

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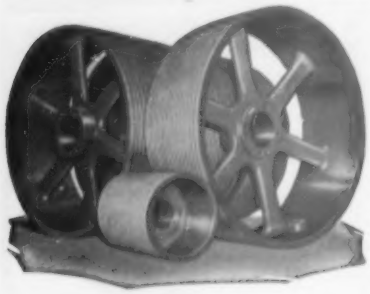

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sate field in Cameron Parish, Louisiana Gulf Coast. Location is for 2 State Lease 2,352, in 10-16s-3w. The test is the second for Royalite in the area, where it completed a gas-condensate well early this year from pay at 9,100 ft.

Cron & Gracey Corp., Houston, is keeping a rig busy in the White Lake area, Vermilion Parish, Coastal Louisiana, where it is drilling for Union Oil Co. of California. Latest operation is 20-A Vermilion Parish School Board, a 6,100-ft. well, in 16-15s-1e.

Survey Drilling Co., Dallas, is drilling for Gulf Refining Co., at a rank wildcat location in Wilcox County, South Central Alabama. The new operation is 1 Wilkerson, in 17-13n-8e, about 7½ miles south of Camden. Hole is projected to the Lower Cretaceous.

Hagestad Drilling Co., has moved on to an old abandoned hole in Tejon field, southeast of Bakersfield, in Kern County, California, which Reserve Oil & Gas Co., will deepen to the 5,750-ft. Olcese horizon recently opened for production in a well 600 ft. to the east. The old hole, 32-34 Reserve-Pauley, in 34-11-19, was drilled 12 years ago to a depth of 4,926 ft.

Neal Shadrick has contracts with Marco Oil Co. for two additional development wells to be drilled in Kern River field, north of Bakersfield, in Kern County, California. The new wells, 3 and 4, will be on the Wilmar lease recently acquired by Marco from A. C. Skilling. Two wells previously had been drilled on the lease.

Scott Brothers Drilling Co. is under contract to Pacific Western Oil Corp. for another wildcat test to be drilled in the Temblor district, west of McKittrick, in western Kern County, California. Location is for 43-12 Hagood, in 12-30-20, near the San Luis Abispo County line. It is 1 mile north of a dry hole drilled last year to 4,515 ft.

Sunnyland Contracting Co., Rayne, La., has a new contract operation under way for Stanolind Oil & Gas Co., in Baldwin County, southwestern Alabama. Location is on U. S. Steel Co. fee lands, southwest of Stapleton. Contract is for 8,000 ft.

Baker-Mundy Drilling Co., Oklahoma City, has contracted with Sunray Oil Corp. for a 5,500-ft. exploratory test to be drilled northwest of Lucien field, in Garfield County, Oklahoma. The test, 1 Hafner, in 12-20n-3w, is about 1 mile from production.

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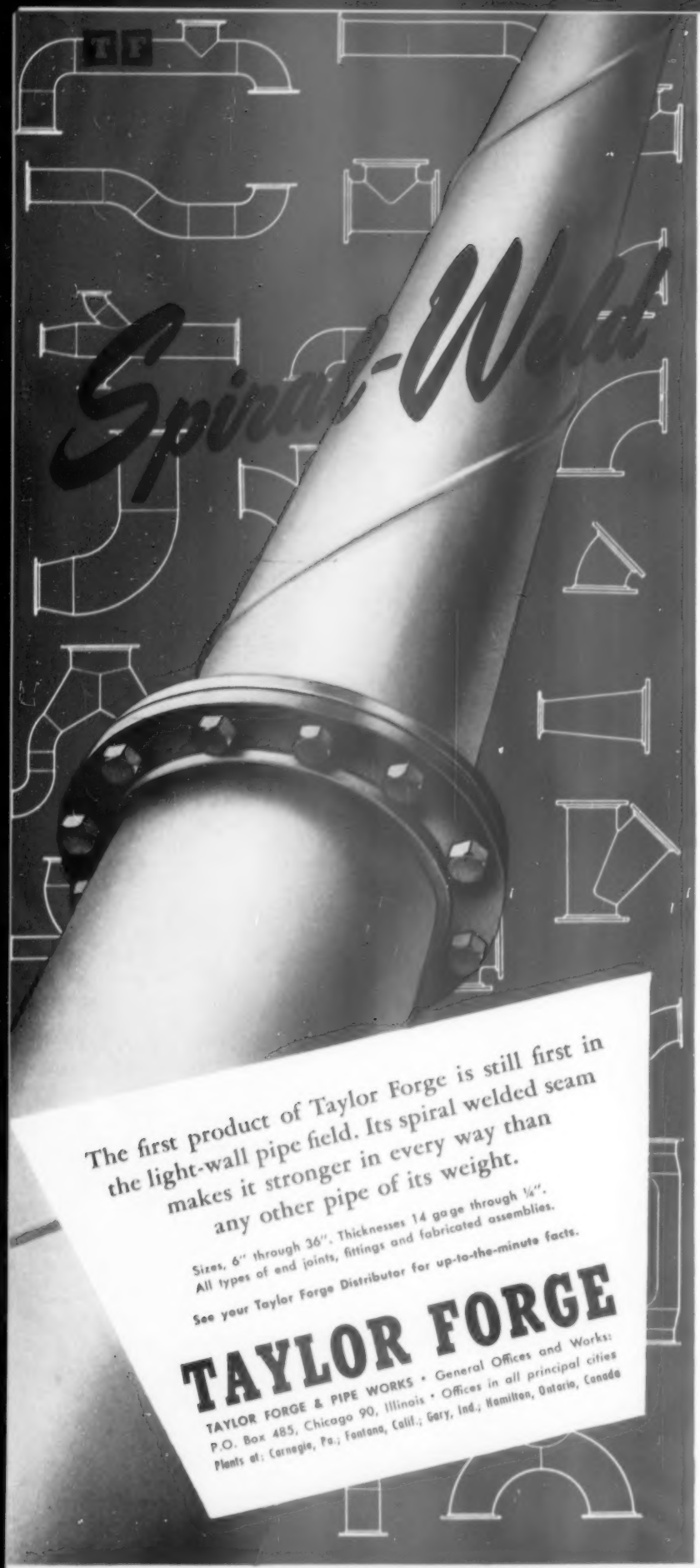
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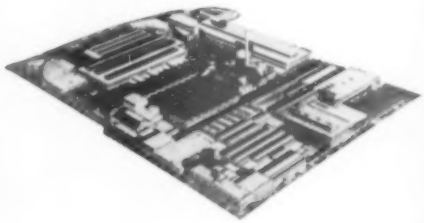

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. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller

Gate Opens, Closes Automatically

This "Drive Thru" gate opens and closes automatically, and requires very little maintenance. It consists of four tapered flexible, whip-action, metal rods each 7 ft. in length. These rods are partially cushioned and tipped with soft plastic to prevent scratching of vehicles. They are attached to a bracket, hinged to a post and swing freely back and forth as vehicles pass through the gate. When the gate is in a closed position electric current from an ordinary electric fence charger is sent through the rods, keeping livestock inside the field. As a safety feature, when gasoline or butane trucks pass through the electric gate, the current is automatically shut off when the gate is opened by a vehicle.

The gate may be locked in an open position, making a passageway 14 ft. wide. This feature is used when moving machinery or equipment which might entangle the gate rods move through the gate. These gates are easily moved from one location to another, and may be installed permanently or temporarily. The gate weighs approximately 25 lb.

One man can easily install it quickly. The gate is sturdy and whether installed permanently or for temporary use, it requires little maintenance. *Schnell Electric Fence Gate Manufacturing Co.*

Check No. 1 On The Time Saver Card

●

Caulking Compound Resists Oil-Gas Deterioration

Del Synthetic Rubber Caulking Compound, which is particularly suited to the petroleum industry because of its resistance to gasoline, oils, water, acids, alkalies, and sun, is a paste (based on Thiokol liquid polymers) which cures without shrinking to a permanent, flexible, solid rubber.

The compound is excellent for sealing around pipes and joints, caulking the inside joints of oil and gasoline tanks, and as a protective coating. When used as a protective coating, the new compound can be applied at any desired film thickness in one coat. It has permanent elasticity, is unaffected by most solvents, can be sandpapered or cut with a sharp tool, and can be coated over with paints or protective coatings.

The compound remains flexible at temperatures as low as —65° F. without becoming brittle, and remains usable at temperatures up to 250° F. without softening. *David E. Long Corp.*

Check No. 2 On The Time Saver Card

●

Electronic Brain Designed For Scientific Computation

An entirely new line of electronic brains is for use in engineering and scientific computation as well as business routines. The new machine, E1O1 Electronic Computer, is contained in a cabinet the size of a normal desk.

Because of its lower cost, smaller size, and versatility, the E1O1 will bring electronic computing techniques within the reach of a much wider range of users. The E1O1 has an internal "memory unit" of the magnetic drum type. The memory unit stores such information as tables of interest rates and logarithms. It also stores intermediate

results of computations and other data required in the solution of problems.

Whenever needed for processing, the information is automatically transferred to the computing mechanism, or other components. Two 12-digit numbers can be added in 2/1,000 of a second. The E1O1 will also subtract, multiply, and divide. Data are introduced through a keyboard. When all the computations have been completed, the machine prints final answers directly at speeds of up to 24 characters a second. The machine automatically selects the proper columns to print answers. It is flexible as to the size and shape of the document used and will handle up to six carbon copies.

While primarily designed to solve engineering and scientific problems, the

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E1O1 has important potential uses in the solution of complex business problems in quality control, pension plans, and technical and statistical work found in all lines of business operation. *Burroughs Crop.*

Check No. 3 On The Time Saver Card

●

Displacement Meters Can Be Tested by Proving Tanks

The accuracy of positive displacement meters can be determined by the meter proving tanks. Pictured is a 1,000-gal. tank. This volume can be flowed through the meter to be checked and the results compared. The meter can then be calibrated to make it coincide with the proving tank. Meter proving tanks are available in sizes from 25 to 2,000 gal., and are made for atmospheric-pressure operation or for pressure service. They can be trailer-mounted if required. They are manufactured in accordance with A.S.M.E.-A.P.I. tentative code specifications or to customer's specifications. *Oil Metering & Processing Equipment Corp.*

Check No. 4 On The Time Saver Card

●

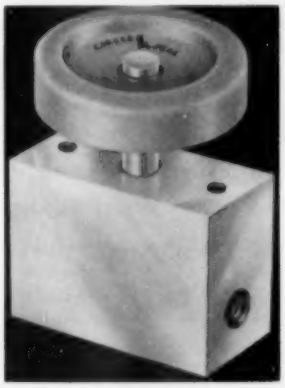
Helical Gear Takeoff Is Made for Easy Installation

Model BH all helical-gear power takeoff is of the latest design and construction. All gears are of the helical design. This gives the power takeoff stronger teeth on the gears and makes possible a quieter running unit. All the bearings are preadjusted and no gaskets need to be added under bearing containers after being in use for a short time.

All bearing races are accurately honed to a super-fine finish that will give longer life to the bearings. More room is allowed around the mounting flange for easier and quicker installation. *Arror Gear Co.*

Check No. 5 On The Time Saver Card

●



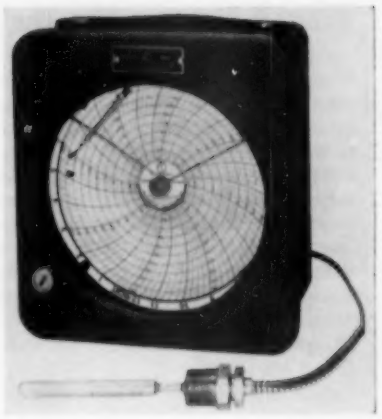
O-Ring and Cone Built Into Two-In-One Shutoff Valve

New 900 series manual shutoff valves offer advantages over conventional throttling and shutoff valves. Positive, leakproof shutoff is provided by a resilient O-ring, yet the O-ring is withdrawn completely and automatically from the fluid stream as soon as the valve begins to open. Throttling is then accomplished by means of a conical metal plug which varies the orifice area. During use for throttling the O-ring is not only entirely outside the fluid stream, but is completely caged so as to prevent any possibility of washout.

In principle the 900 series valve is two valves. The shutoff section employing an O-ring is drawn back into the throttling section when the valve is opened, both actions being accomplished in a single motion.

No reversal or abrupt change in direction of flow takes place within the valve, assuring low pressure drop even when pressure and/or flow rate is high. Rated at 0 to 3,000 psi., these valves can be used in either hydraulic or pneumatic service and operate smoothly and easily up to full rated capacity. *James-Pond-Clark.*

Check No. 6 On The Time Saver Card



Temperature Recorder Is Added to Instrument Line

Model 1000 temperature recorder is a sturdy instrument with 6-in., clear-reading, evenly calibrated chart. It is available with 24-hour or 7-day electric or mechanical chart drive. Standard charts have ranges between —40° F. to +500° F., according to need.

Model 1000-A, for wall mounting, has bottom connection with brackets for mounting on panel boards or walls and 5-ft. lengths of double-braided flexible capillary tubing. Model 1000-B (illustrated) is portable with leather strap handle and capillary tubing on spool at back of case. Model 1000-C is also a portable, self-contained unit with leather strap handle. *Electric Auto-Lite Co.*

Check No. 7 On The Time Saver Card

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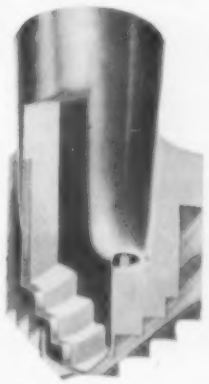


Slim-Hole Bit Allows More Air and Liquid Volume

This new medium-hard formation slim-hole, shot-hole drilling bit was designed to allow greater bottom-hole volume for both air and liquid circulation. Featuring a tool joint box which offers the slightest possible restriction to the tool joint inside di-

What's New... Use the handy Time-Saver Cards

ameter, the KI-2 bit may be used both as a soft formation and a medium-hard formation bit.

The bit also incorporates the development of a new method of bonding pure sinter tungsten to the cutting and reaming edges so it will withstand the shock encountered in operation. Other features include 5-in. long reaming edges, short water courses to prevent plugging, and heat treated steel bodies. *Bill White Bit Co.*

Check No. 8 On The Time Saver Card

●

Midget Heads Eliminate Tube Maintenance Trouble

A full line of midget cleaner heads and motors are flexible and powerful enough to completely eliminate small-diameter tube maintenance difficulties. They are extremely valuable for thoroughly cleaning light scale from heat-exchanger and condenser tubes, and will quickly remove other foreign deposits from small straight or curved tubes in refinery or industrial installations.

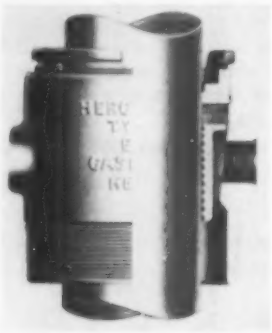
Midget Cleaners are made in a wide variety of cutter, drill, and brush heads, expanding and nonexpanding, to fit every type of cleaning operation. When used in combination with universal joints or flexible shafts, they are effective in cleaning bent tubes where the radius or curvature is short. *The Airetool Manufacturing Co.*

Check No. 9 On The Time Saver Card

●

Casing Head Designed for Full Casing Weight Support

Type E casing head with slips, made of electric cast steel and tested to 2,000 psi., has two 2-in. side outlets. Over-all height is approximately 10 in. Slips are hinged together making them easy to install. Packing nut is in one piece, is full-opening, and will pass centralizer and casing couplings. Special notches are provided in top of packing nut to



accommodate wrench or pinch bar. This head, designed as an economical means of supporting and packing-off casing strings in wells of medium depth and pressure, will safely support the weight of 4,500 ft. of casing up to 7-in. o.d.

Head is full opening, and made in 8⅝-in. and 10¾-in. sizes. It is available with either male, female, or slip-joint casing connection. The 8⅝-in. size will accommodate up to 5½-in. o.d. casing, while the 10¾-in. size will

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accommodate casing up to and including 7-in. o.d. *Hercules Tool Co.*

Check No. 10 On The Time Saver Card

●

Vapor Equivalent Apparatus Used to Test Gas Samples

The vapor equivalent apparatus is designed for the determination of the vapor equivalent and molecular weight of liquid residues from natural gas samples, but can be applied to any liquid which has a vapor pressure of more than 4 mm. of Hg at the temperature of the vaporization bulb.

This new analytical instrument provides, in a compact unit, a vaporization bulb with an integral multiplying manometer and a removable sample entry system consisting of an orifice and matching pycnometer. The unit is mounted in an all-glass constant temperature bath with stainless steel snap-in clamps, and is supplied with a preformed immersion heater.

The procedure consists of filling the pycnometer with sample, admitting the sample to the previously evacuated vaporization bulb, and reading the pressure on the multiplying manometer. The molecular weight is then calculated from the previously determined specific gravity. *Instrument Sales Division, Phillips Petroleum Co.*

Check No. 11 On The Time Saver Card

●

Pipe Saw Makes Cut and Bevel in One Operation

A recently constructed 860-mile gas line used a new welding system at all highway, railroad, and river crossings where ¾-in. wall pipe is joined to ½-in. wall pipe. This new type of weld preparation eliminates the use of a transition piece, allowing one weld to take the place of two, and permitting greater distance between welds, in keeping with best welding practices. Field machining of the ½-in. wall pipe with the new inside beveling attachment, for the Wachs National pipe saw, makes this single-type weld possible.

Pipe with ½-in. walls was double or triple-joint welded into lengths required for crossings. Test plugs were then welded on the ends and an 8-hour hydrostatic test was run on every crossing section. This necessitated cutting the test plugs off of the heavy wall pipe at completion of the hydrostatic tests. The Wachs National pipe saw with a standard saw and external bevel cutter were used. This cut and bevel were made in one operation. At the completion of this cut the beveling attachment was placed on the basic saw unit and an internal bevel machined to reduce the ½-in. pipe down to proper welding thickness for ⅜-in. wall pipe. This results in a machine-shop bevel (inside and outside) ready for welding with no change in the physical properties of the pipe. *The E. H. Wachs Co.*

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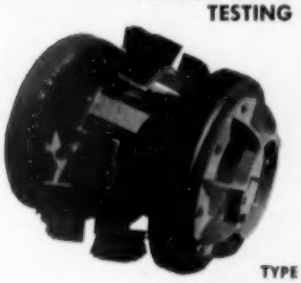
COMPACT ECONOMY IN

WEAR COMPENSATING PIGS

PROVEN BY 2 YEARS TESTING



TYPE UG-1
WmSON PIG sizes 12"-18" with 80-lb. Springs

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low-cost construction plus long life brushes and cups

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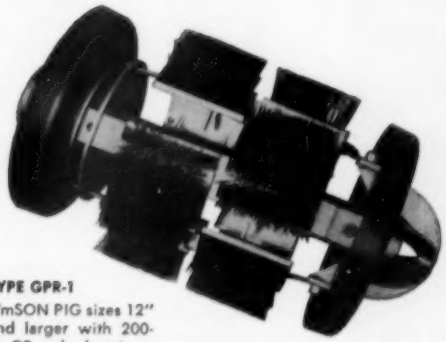

TYPE GPR-1
WmSON PIG sizes 12" and larger with 200-lb. GP arched springs.

FULL PIPE COVERAGE
by overlapping arrangement of spring expanded brushes

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THE PIG WITH THE POKE CLEANS PIPE LINES
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They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

GS Centrifugal Pump. A four-page illustrated bulletin contains design features and specification data on De Laval Type GS (general service) pump. The new bulletin illustrates the ease of maintenance and service features of GS pumps, including the rotor assembly which contains all working parts, and which lifts out of the casing as a single unit. Other features are the mechanical seal and life-time lubricated bearings. *De Laval Steam Turbine Co.*

Check No. 13 On The Time Saver Card

●

Catawissa Unions and Swing Check Valves. The newly released 24-page Catalog 11 contains complete engineering data and specifications on the Perfect Seal line of hot-forged-steel pipe unions and swing check valves. In addition to its standard and double extra heavy weight unions in hot forged steel, the company offers full-alloy and full-stainless steel unions. *Catawissa Valve & Fittings Co.*

●

Check No. 14 On The Time Saver Card

Indirect Heaters. The 16-page Catalog 32-02 gives complete information on the new Series 70 indirect heater, including capacities, dimensions, flow coil sizes, and standard equipment. It describes and illustrates uses and features for both gas heating and oil heating problems. Each problem is solved step by step with full use of graphs and charts. *Black, Sivalls & Bryson, Inc.*

Check No. 15 On The Time Saver Card

●

Winches for Trucks and Crawler Tractors. Winches with capacities from 6,500 to 80,000 lb. are illustrated in a 4-page, multicolor brochure, No. SF-252. Cut-away illustrations and data tables cover the complete line. *Tulsa Winch, Division of Vickers, Inc.*

Check No. 16 On The Time Saver Card

●

Pipe Repairs for All Types of Leaks. A completely new catalog and manual No. 54 covers a line of pipe repair clamps, service saddles, valve and bibb reseaters, bibb seat dressers, pipe benders, and boss hickeys. It is a valuable source book of information on the repair of all types of leaks in water, steam, gas, oil, ammonia, and brine lines. *M. B. Skinner Co.*

●

Check No. 17 On The Time Saver Card

Industry's Partner for Progress. In 24 pages, this multicolor book illustrates the complex structure of a $50,000,000 petrochemical plant built for National Petro-Chemical Corp. at Tuscola, Ill. The booklet outlines the work done by the plant's major contractor in planning, designing, and constructing one of the world's largest petrochemical plants. *J. F. Pritchard & Co.*

Check No. 18 On The Time Saver Card

●

Series 98 Link-Belt Speeder. Book 2530-4-54 features a 1-yd. shovel-crane equipped with Speed-O-Matic power hydraulic control. Crawler, truck, and wheel-mounted models are illustrated. The unit is fully convertible to shovel, hoe, or crane. *Link-Belt Speeder Corp.*

Check No. 19 On The Time Saver Card

●

Pump - Pressure Recorders. Oil well service companies in the field of acidizing, cementing, hydraulic fracturing, dewaxing, and gravel packing should be interested in Bulletin P-3. It illustrates and describes in detail, different kinds of indicating and recording equipment. Many sizes, specifications, and combinations of features on both portable and truck-mounted models, are shown. *Martin-Decker Corp.*

Check No. 20 On The Time Saver Card

●

If You Use Water. Illustrated liberally with two-color flow diagrams, the four-page booklet discusses the fundamentals of the three major classifications of industrial water treatment based on ion exchange: softening, dealkalization, and deionization. Under each of these classifications, the booklet presents the major process variations. The advantages of the various water treatment methods are discussed and interpreted in terms of the applications in specific industries. *Rohm & Haas Co.*

Check No. 21 On The Time Saver Card

●

Lubricated Plug Valves, a new 24-page Reference Book No. 39-5, shows Homestead lubricated plug valves in full-port and venturi types, sizes up to 14 in., and with a choice of self-

sealed, two-piece, or one-piece plug designs. Engineering information includes principal dimensions, types of control, metals, and lubricants. *Homestead Valve Manufacturing Co.*

Check No. 22 On The Time Saver Card

●

New Piston Ring Bulletins. A new series of bulletins feature custom engineered sealing ring combinations, as well as plain piston ring combinations. These bulletins are available for all makes and models of diesel and gas engines and compressors. Pictures illustrate the piston rings to be used for each ring groove, and include ring sizes and ordering information. *Double Seal Ring Co.*

Check No. 23 On The Time Saver Card

●

Ironite Primers. Latest data on properties and applications of the complete Ironite line of primers for metal surfaces are given in Technical Bulletin No. 5401. Color chips and full descriptions of Ironite red oxide, zinc chromate, red lead, and gray metal primers are given in the four-page, two-color booklet. *General Paint Corp.*

Check No. 24 On The Time Saver Card

●

Blowoff Valves Plus 1,500 and 2,500-lb. Univalves. Catalog 12-D1 features a redesigned line of blowoff valves with flanged or welding ends and bolted bonnets for 300, 400 to 600, 900 to 1,500-lb. classes, plus the addition of welded bonnet blowoff valves with welding ends for 1,500 and 2,500-lb. classes. "What You Should Know About Blowoff Valves," a new article in the catalog should be of particular interest. Two pages are devoted to tips on selection, operation, and installation of blowoff valves. *Edward Valves, Inc.*

Check No. 25 On The Time Saver Card

●

Centrifugal Pump Fundamentals. This 12-page form is written in simple language and illustrated with easily understood diagrams. It should be useful to all pump operators and installation and maintenance men as it explains the principles of operation, defines the various terms used in pump calculations, and works out typical pump problems. Included are "Centrifugal Pump Analogies," "How to Calculate," "Total Head or Pressure," "Capacity or Quantity Delivered," "Specific Gravity or Weight of Liquid," "Hydraulic and Brake Horse Power," and "Pump Pressure." *Ingersoll-Rand Co.*

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Flame Arrestors
are a
DEPENDABLE
Flame Stop

● These arrestors combine the desired flame stoppage and explosion prevention with minimum pressure drop. Sturdy, rugged semi-steel housings and covers. Corrosion resistant aluminum "banks" have vertical straight through passages, minimizing clogging and simplifying inspection;— extensible for easy cleaning. 2" to 10" sizes. *Write for Bulletin No. 471-R. It gives full details.*

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EQUIPMENT MEN . . . in the News

Wilson Supply Men Tour Mission Plant

A group from Wilson Supply Co. toured the Mission Manufacturing Co. plant recently to observe the steps in manufacture and testing of Mission products. Pictured with some of the Mission representatives are, first row: Jack Stewart, of Mission; Tommy Thompson, Bill Cato, George Gist, and L. E. Sheptrine, of Wilson. Back row: Tony Volotko, of Mission; Wallace Julian, Clive Runnells, Jim Rucker, of Wilson; Shad Mims, of Mission; and Lester Lenart, of Wilson.

Cardinal Shifts Jarman To Sales Position

Roscoe Jarman, former assistant chemist, Cardinal Research Laboratories, Odessa, Tex., has been transferred to Nocor sales for Cardinal Chemical, Inc. Nocor is Cardinal's corrosion inhibitor for use in producing wells. Jarman joined Cardinal research staff in 1953 and has been actively engaged in the development of new inhibitors in the Nocor series. Jarman's territory will cover the Permian basin west of Odessa, Tex.

Allan Edwards Named Area Agent for Warner Lewis Co.

Allan Edwards Co., Inc., Tulsa, has been appointed Mid-Continent area representative for Warner Lewis Co. The territory covers Oklahoma, Kansas, Nebraska, and Arkansas. In addition to the home offices in Tulsa, Allan Edwards Co. maintains branch offices in Dallas and Kansas City.

All items manufactured and distributed by Warner Lewis including water separators, calibrating tanks, industrial filters, and nonferrous and alloy fabrication will be handled.

National Supply Sends Allan to Venezuela

R. Carson Allan, division engineer for the Export Division of The National Supply Co., has been appointed district manager of the company's expanded operations in western Venezuela, with offices at Maracaibo, Venezuela.

R. C. ALLAN

BIGGERSTAFF

Neil B. Biggerstaff, sales engineer attached to the company's general offices in Pittsburgh, has been transferred to the Export Division headquarters, New York City, to succeed Allan.

Allan joined the company in 1938. From 1939 to 1947 he was with the engineering department of the Toledo plant, serving mostly in the oil fields. He was transferred to the Export Division in 1947, appointed assistant division engineer in 1948, and division engineer in 1952.

Biggerstaff joined the company in 1938 at Houston, and engaged in general sales work at New Iberia, La., and Fort Worth. He was appointed a sales engineer in 1945, serving in Houston, Toledo, and Pittsburgh.

Hamer Oil Tool Changes Name to Hamer Valves, Inc.

A change of the company name from Hamer Oil Tool Co. to Hamer Valves, Inc., has been announced by Leland (Shorty) Hamer, president of the organization. In advising of this new name, Hamer indicated the change was made primarily to more clearly identify the company with the products it manufactures.

Hamer Valves, Inc., is located at Long Beach, Calif.

J. & L. Men Study Ideco Equipment at Beaumont

An intensive study of Ideco equipment by the Supply Division of Jones & Laughlin Steel Corp. has been in progress since J. & L. took on the Ideco line some months ago. Key men in the sales department have gone to the Ideco plant in Beaumont, Tex., from J. & L. stores and offices for an educational training program. J. & L. men in the group pictured here are: O. M. Lorenz, assistant district sales manager, Illinois-Kentucky district; G. A. McDaniel, sales office manager, Dallas; G. A. Whiteker, salesman, Hobbs, N. M.; J. F. Hunter, Jr., salesman, Winfield, Kans.; Harvey Durham, salesman, Casper, Wyo.; B. G. O'Brien, salesman, Mount Pleasant, Mich.; W. J. Whatley, salesman, Oklahoma City; Bill Wood, salesman, Natchez, Miss. Three other groups have already attended the educational training program in Beaumont as a practical first step in being of real assistance to drillers interested in Ideco equipment.

Chaney and Holloway Are Promoted by Western Co.

Ralph Chaney has been promoted to field supervisor at the Odessa, Tex., district, and Glen Holloway has been given the same position for the Snyder, Tex., district, for The Western Co., technical oil-well servicing company of Midland, Tex. These two field management promotions in the Permian basin area were announced by Walter Beadle, operations vice president.

Chaney has been a service engineer with Western at Ulysses, Kans., for the past 2 years. Holloway has been with Western in various Permian basin districts since 1948, and most recently has served as a service engineer at Snyder.

Kutscher Joins Totco Staff in Williston Basin

A. E. KUTSCHER

Andrew E. Kutscher has joined the service staff in the Williston basin of Technical Oil Tool Corp., according to H. H. (Pete) Peters, president. Kutscher will base his operation at Williston, N. D. A. D. Tucker, who has been serving the Williston basin area for the past 2 years, has been transferred to Duncan, Okla., to represent Totco in the Duncan and Healdton areas.

German Pipeline Engineers Visit C-R-C Pipe Yard

Five German pipeline engineers and industrialists, who are touring the United States for a look at outstanding pipeline installations, were flown to Houston recently by Crutcher-Rolfs-Cummings to see C-R-C's automatic pipe yard operating on the Houston Ship Channel. This was the first stop on their tour. Pictured at the yard are: Jack Scott, C-R-C; Siegfried Schwaigerer; Werner Versen; Wilhelm Jamm; A. E. Johnson, C-R-C; Wilhelm Raedeker; Hans Geilenkeuser; Bob Hoslander, Rhinetubes, Inc., Houston; and J. S. Ahearn, Sipanam, Inc., New York.

J. B. Beaird Conducts Annual Sales Meeting

Sales representatives and sales engineers from the 48-state sales area of The J. B. Beaird Co., Inc., gathered in Shreveport recently for the firm's annual spring sales meeting. Sixty men, including approximately 36 out-of-state representatives, participated in the intensive educational and sales training program. The meeting included new product discussions and demonstrations as well as inspection of latest manufacturing methods. The annual event is a phase of the continuous sales training program conducted by Beaird. Pictured at the Beaird sales meeting are, front row: H. H. Cochran, Sodus, Mich.; J. W. Hendryx, Shreveport; Horace Thomasson, Bossier City, La.; S. L. Gordon, Los Angeles; Al Berg, Shreveport; John Birkos, Chicago. Second row: W. W. Sentell, Tulsa; E. G. Owens, Stockton, Calif.; B. N. Owens, Shreveport; L. W. Abbott, Montgomery, Ala.; Harold Graviss, Elizabethtown, Ky.; Dawson Lary, New Orleans; George Crozier, Shreveport; Vernon Burkhead, New York; Roy Hathorn, Shreveport. Third row: J. L. Tullis, general manager of sales, Shreveport; Fred Hendrix, Atlanta, Ga.; Gerald Pope, Houston; J. F. Atkinson, Shreveport; W. F. Raynolds, Midland, Tex.; Raymond Keller, Corpus Christi, Tex.; Leo Johnson, McLeansboro, Ill. Ty Adams, Shreveport; J. L. Riseden, Shreveport; George Gaston, Shreveport; Bill Gulledge, Portland; C. Ray Elrod, Bossier City; E. S. McRoberts, Shreveport; Warren Parish, Shreveport; Richard Meisenbach, Shreveport; Charles Haynes, Shreveport; George Borgeson, Shreveport; V. L. Stevens, Shreveport; Paul Akers, Dallas; Harry Gill, Shreveport; M. A. Finuf, Shreveport; Doug Winn, Luling, Tex.; W. W. Marston, Shreveport; M. C. Phillips, Oklahoma City; R. W. Rademacher, Shreveport; Ken Miller, Daytona Beach, Fla.; Rex Wheeler, Shreveport; Lee Rasmussen, Des Moines, Iowa; Jim Rigsby, Shreveport.

Fairbanks, Morse Dedicates Kansas City Pump Plant

Seen from the air, the new Fairbanks-Morse manufacturing plant and foundry occupy a 38½-acre site at Kansas City, Kans. The manufacturing department is the building in the foreground. Offices of the Kansas City Pump Works and the nation-wide pump sales division are housed in the brick wing in the immediate center. Beyond the manufacturing department is the foundry with a floor space of 147,600 sq. ft.

The new Kansas City Pump Works of Fairbanks, Morse & Co., Chicago manufacturing firm, was formally dedicated recently. Geared to a monthly output of 2-million-dollars' worth of products, the new plant has one of the nation's most modern foundries and a manufacturing department which occupies 180,000 sq. ft. of space.

Taking part in the formal ceremonies were Robert H. Morse, Jr., president; John R. Walsh, plant manager; Mayor Clark E. Tucker, of Kansas City, Kans.; and Marshall Burch, president of the local Chamber of Commerce.

The completely mechanized foundry, with its towering cupolas, three-story core furnaces, large electric furnace, and a system of pipes that blows sand from one location to another as though it were a fluid, is able to turn out 82 tons of castings a day. The foundry occupies 147,600 sq. ft.

The manufacturing department is equipped with two overhead cranes, each with a 13-ton capacity and 3 pendant or floor-operated 3-ton cranes.

There are two test laboratories, located in the center of the manufacturing department, where all pumps are checked for performance before being shipped to customers. One of the laboratories is used for testing pumps up to 10-in. capacity and the other, which

will be used mainly for experimental work, can test pumps up to 16-in. capacity.

A two-floor office section occupies 18,000 sq. ft. Main offices are production, engineering, accounting, process engineering, and pump sales division.

Lane-Wells Co. Opens Three New Branches

To provide additional facilities for oil-field customers, Lane-Wells Co. has opened three new branches, bringing the total to 95 in the United States, Venezuela, and Canada, Rodney S. Durkee, president announced.

New truck stations were opened at Pleasanton and Seminole, Tex. R. H. Ault, formerly gun perforator operator at Corpus Christi, Tex., is operator in charge of the new Pleasanton base. R. E. Parmley, formerly station superintendent at Hobbs, N. M., is now station superintendent of the new Seminole base.

The Gulf Coast division sales department has been moved to a downtown location in the Bakers Mortgage Building, Houston.

Norris Holds Three-Day Sales Meeting

Sales representatives of W. C. Norris Manufacturer, Inc., met in Tulsa recently for a three-day general sales meeting. The first day was spent touring the manufacturing facilities of the Tulsa plant, followed by conferences which were conducted by Bill Davidson, Norris sales manager. Improvements made in the manufacture of Hinderliter well heads, sucker rods, and fittings were the main topics of discussion. Representatives attending were, front row: William L. Butler, executive vice president; W. C. Tolleson, Kilgore, Tex.; C. T. Fair, Great Bend, Kans.; E. C. Bolger, president; G. W. Davidson, sales manager; A. A. Hardy, chief engineer. Second row: J. G. Russell, Oklahoma City; Paul Hagaman, Tulsa; Arthur Miller, Jr., assistant sales manager; Clint Cross, general superintendent; R. A. Colgin, vice president in charge of production; Don Stewart, Midland, Tex.; C. L. Snelling, Houston; Kenneth Cook, Abilene, Tex. Third row: R. E. McBurnette, Tulsa; Doyle Bain, Corpus Christi; Jack Getty, Shreveport, La.; LeRoy Mitchell, Casper, Wyo.; Archie Ethridge, Oklahoma City; Jack Schaff, Wichita Falls, Tex.; Hamp Brooke, Houston; Paul Colvard, Houston. Back row: Clyde Sights, Evansville, Ind.; Marvin Parker, Odessa, Tex.; Sonny Preis, Lafayette, La.; Dan Coates, Wewoka, Okla.; Jere Whitaker, Fort Worth. Not shown are C. B. Schofield, Tulsa, city sales; J. E. Giles, northern Oklahoma; and E. L. Mick, warehousing agent for Norris-Hinderliter products at Seminole, Okla.

Rector Representatives See New Facilities

At its annual sales meeting, held at the home office in Fort Worth, representatives of Rector Well Equipment Co., Inc., were taken on a tour of recently added plant space and manufacturing facilities. Business sessions of the meeting featured discussions of new developments in Rector equipment during the past year and new products in the planning stage. Attending the meeting were, seated: M. C. Davis, Denver; Myrl Andrews, Fort Worth; Blake Fisher, Houston; W. P. Knight, Midland, Tex.; C. L. Cron, Houston; R. V. Evridge, Fort Worth; L. L. Rector, Fort Worth; Charles W. Zartman, Fort Worth. Standing: J. L. Pinkard, Fort Worth; Almon B. Teel, Fort Worth; Eugene Beaupre, Fort Worth, George Nicholas, Fort Worth; Sam Beavers, Jr., Fort Worth; Howard Johnson, Corpus Christi, Tex.; George Stewart, Fort Worth; John P. Scott, Hobbs, N. M.; Lloyd A. Davis, Oklahoma City; Joan Malone, Fort Worth; Richard R. Rector, Odessa, Tex.; Fay Parks, Fort Worth; T. C. McDonald, Alice, Tex.; Wilma Thomas, Fort Worth; W. L. Ward, Shreveport; Grady Cooper, Odessa; Frances Bills, Fort Worth; Frank Blanton, Fort Worth; John L. Curry, Fort Worth; Winnifred Roberts, Fort Worth; G. T. Wallace, Fort Worth; W. R. Tipsword, Tulsa; Dorothy Johnston, Fort Worth; G. M. Robinson, Abilene, Tex.; Gordon McHan, Fort Worth; John Freeman, Fort Worth; Charles D. McDonald, Houston; A. J. LaBate, Fort Worth; G. A. Lastrapes, Lafayette, La. George S. Badger, Calgary, Alta., and W. C. Langley, Barranquilla, South America, were unable to attend.

Mid-Continent Makes Personnel Shifts

Expansion by Mid-Continent Supply Co. in the Gulf Coast and Rocky Mountain areas has caused several shifts in Mid-Continent personnel throughout the company's area of operation, according to a recent announcement in Fort Worth by President Ken W. Davis.

R. L. MOYER

In Denver, R. L. Moyer has been promoted from sales representative to district manager, Denver district. In Casper, Wyo., C. D. McIver was promoted to district manager, Casper district, along with his transfer from managership of the Mid-Continent store in Abilene, Tex. O. G. Garner in Williston, N. D., has been promoted from store manager to assistant district manager, to be located at Williston. With the promotion of Garner, H. T. Branum, field salesman in Newcastle, Wyo., has been transferred to Williston as store manager.

C. D. McIVER

R. S. WEILMAN

Because of the shift of location of McIver, certain changes have been made in Mid-Continent's North Texas district. Bill Thornton, formerly store manager in Bowie, has been transferred and elevated to store manager in Abilene. Replacing Thornton as store man-

ager in Bowie is R. P. Brown, formerly store manager at Magnolia, Ark. F. A. Deiterman has been transferred from Farmington, N. M., to Magnolia and promoted from field salesman to store manager.

In the Gulf Coast area of operations, R. S. Weilman has been promoted from Houston store manager to New Orleans district manager. Taking over Weilman's job in Houston is J. P. Jones, formerly store manager in Lake Charles, La. Jones has been followed at Lake Charles by M. E. Cassidy, who was transferred from Falfurrias, Tex., where he also served as store manager. Replacing Cassidy as store manager at Falfurrias is W. J. Kirby, who formerly served as field salesman at Lake Charles.

Baker Oil Tools Completes Series of Sales Meetings

Baker Oil Tools, Inc., has just completed a series of sales meetings with its district and branch managers. The meetings were held at Corpus Christi, Odessa, and Beaumont, Tex.; Oklahoma City, and Wichita, Kans.

Highlights of the meetings were talks given by T. L. Osborne, district superintendent, Phillips Petroleum Co., at Corpus Christi; H. J. Shumate, petroleum engineer, Gulf Oil Corp., at Odessa; W. Wilson, Wilson-Broach Oil Co., at Beaumont; G. B. Grumbine, district superintendent, Anderson-Prichard Oil Corp., Oklahoma City; and C. A. Hill, district production superintendent, Magnolia Petroleum Co., at Wichita, on the subject "What is Expected of a Service Company."

An open house was held following each meeting which was attended by oil company personnel. The feature of the open house was a display of Baker products for permanent-type well completions and a cutaway model of the Baker differential fill-up shoe.

Attending Baker's Oklahoma City meeting were, seated: G. D. Hall, assistant manager, Central division; W. S. Althouse, chief engineer; P. E. Hilton, manager, sales and service, Central division; V. L. Taylor, secretary, Oklahoma City; R. W. Henderson, vice president and assistant general manager; E. F. Hannon, Jr., district manager, Mid-Continent district; R. C. Glover, foreign and domestic sales engineer, Tulsa. Standing: C. A. Greve, division staff engineer; C. J. Berlin, division sales engineer, Dallas; E. W. Johnson, branch manager, Duncan, Okla.; W. R. Gamble, branch manager, Hominy, Okla.; K. E. Hawkins, branch manager, Oklahoma City; J. P. Gallagher, branch manager, Gainesville, Tex.; T. J. Singley, branch manager, Olney, Ill.; B. H. Jones, district sales engineer; C. J. Taylor, division sales engineer; G. E. Diggs, division staff engineer; C. C. Taylor, district manager, West Texas; R. C. Finley, branch manager, Seminole, Okla.; G. W. Mitchell, district manager, Kansas; W. W. Farrar, branch manager, Wichita Falls; F. L. Scott, purchasing agent.

At the Corpus Christi meeting were, front row: N. H. Lytton, district manager, Southwest Texas; P. E. Hilton; M. Hunt, secretary, Corpus Christi; R. W. Henderson; M. C. Muckleroy, branch manager, Corpus Christi. Back row: C. A. Greve; J. P. Wilkerson, branch manager, McAllen, Tex.; G. A. Sullivant, district manager, Texas-Gulf; B. O. Ellington, division sales engineer; F. L. Scott; R. W. Jones, branch manager, Freer, Tex.; H. B. Edwards, branch manager, Falfurrias, Tex.

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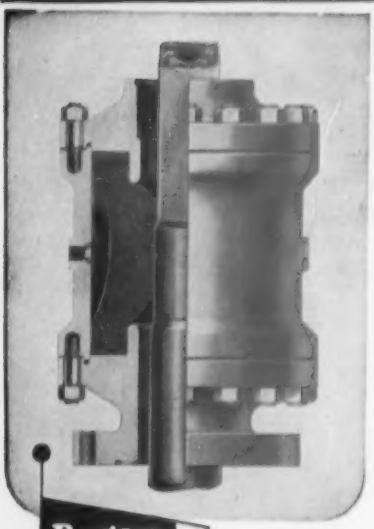

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Attending the Wichita meeting were, front row: R. L. Turner, district manager, Rocky Mountain district; G. W. Mitchell, district manager, Kansas; P. E. Hilton; R. W. Henderson; R. C. Glover; A. A. Hughes, engineer. Back row: J. E. Meador, district sales engineer, Rocky Mountain district; F. J. Field, branch manager, Great Bend, Kans.; F. D. Beedles, branch manager, Hill City, Kans.; L. E. Walker, branch manager, Liberal, Kans.; D. A. Stuart, branch manager, Pampa, Tex.; E. M. Solter, branch manager, El Dorado, Kans.; F. L. Scott; E. F. Hannon, Jr.

At Baker's Beaumont meeting were, front row: R. S. Bedillion, district manager, Ark-La-Tex; G. A. Sullivant; P. E. Hilton; D. S. Kellan, secretary, Beaumont; R. W. Henderson; G. D. Hall; G. E. Turner, district manager, La.-Gulf. Back row: H. C. Welch, branch manager, Laurel, Miss.; G. M. Briggs; J. L. Chronister, branch manager, Lafayette, La.; P. H. Galbraith, branch manager, Houma, La.; W. P. Donnelly, branch manager, Kilgore, Tex.; D. C. Lewis, branch manager, El Campo, Tex.; B. O. Ellington; S. O. Timmons, branch manager, Palestine, Tex.; M. W. Lay, branch manager, Magnolia, Ark.; M. P. Taylor, branch manager, Shreveport; P. G. Honeycutt, branch manager, Harvey, La.; J. N. Berry, branch manager, Victoria, Tex.; C. Holder, branch manager, Liberty, Tex.; J. F. McGuffin, branch manager, Luling, Tex.; R. A. Toney, branch manager, Beaumont; H. L. Applewhite, branch manager, Houston; F. L. Scott; O. H. Menke, branch manager, Lake Charles, La.; A. A. Hughes.

Attending the Odessa meeting were, front row: C. A. Greve; C. C. Taylor; P. E. Hilton; B. Fields, secretary, Odessa; R. W. Henderson; J. T. Mitchell, branch manager, Odessa; W. S. Althouse. Back row: N. H. Lytton; F. L. Scott; G. W. Mitchell; G. A. Sullivant; E. F. Hannon; J. T. Brian, branch manager, Abilene, Tex.; J. V. Bergman, branch manager, Farmington, N. M.; W. F. Noxon, branch manager, Hobbs; B. O. Ellington; J. F. Holcomb, Snyder, Tex.; M. R. Litchfield, branch manager, Levelland, Tex.

Alco Plant Tour Made By Pipeline Executives

More than 40 key oil company and pipeline executives interested in stationary-diesel-engine applications were guests of American Locomotive Co. at Schenectady, N. Y., May 13. A special airplane flight was arranged by the company so that the visitors could make a 1-day trip immediately following the conclusion of American Petroleum Institute convention at Philadelphia.

Among the group visiting the Alco plant were: L. F. Scherer, director of engineering and construction, Texas Pipe Line Co., Houston; J. R. Polston, vice president, Service Pipe Line Co., Tulsa; P. D. Phillips, Jr., chief engineer, Humble Pipe Line Co., Houston; H. R. Hoyt, chief mechanical engineer, Great Lakes Pipe Line Co., Kansas City, Mo.; H. A. Johns, chief engineer, Gulf Refining Co., Houston; Kendall W. Miller, superintendent of operations, Socony-Vacuum Oil Co., Wichita; D. A. Roach,

chief engineer, Phillips Petroleum Co., Bartlesville, Okla.; C. F. Preuss, superintendent, Keystone Pipe Line Co., Philadelphia; C. F. Gearhart, chief engineer, Standard Oil of Indiana, Chicago; Alex S. Chamberlain, vice president, Ashland Oil & Refining Co.; J. G. Norton, chief mechanical engineer, Magnolia Pipe Line Co., Dallas; and R. P. Hamilton, general superintendent, Southeastern Pipe Line Co., Atlanta.

The visitors spent the morning inspecting Alco's chemical laboratory, diesel engine laboratory, diesel school, and engineering facilities. Following lunch, the group toured the company's diesel engine assembly shop, Schenectady renewal parts warehouse, and combat-tank manufacturing and testing facilities.

Shown in Alco's diesel engine laboratory are, left to right: A. T. Lawrance, Alco general manager of field sales; J. R. Polston, vice president, Service Pipe Line Co.; John Thomas, Alco stationary diesel engine product manager; and L. F. Scherer, director of engineering and construction, Texas Pipe Line Co. Scherer is holding a photoplate used to determine diesel engine wear through spectroscopic analysis of crankcase oil.

Sieger Heads Neptune Petroleum Meter Sales

W. H. SIEGER

Walter H. Sieger has been appointed sales manager of petroleum and industrial meters for Neptune Meter Co. D. E. Broggi, president of Neptune, said the promotion of Sieger, formerly an assistant to the general sales manager, was part of a reorganization of the company's sales division following the recent acquisition of Revere Corp. of America, and Cox & Stevens Aircraft Corp.

Sieger joined Neptune in 1933 as an engineer, and was promoted to research engineer in 1943. He was assistant manager of engineering from 1945 to 1951 when he was transferred to the sales division.

Hunt Names K & W as Rocky Mountain Representative

Hunt Tool Co. announces the appointment of K & W Sales & Service as its representative in the Rocky Mountain area.

K & W Sales & Service, Casper, Wyo., is owned and operated by J. M. (Cotton) Wigley and R. K. (Bob) King. Wigley and King are both former employes of Hunt Tool who decided to enter the Rocky Mountain area as manufacturer's agents for a number of products. They maintain a stock of Hunt Tool products including the new swivel joint and wire line coring equipment.

J. M. WIGLEY

R. K. KING

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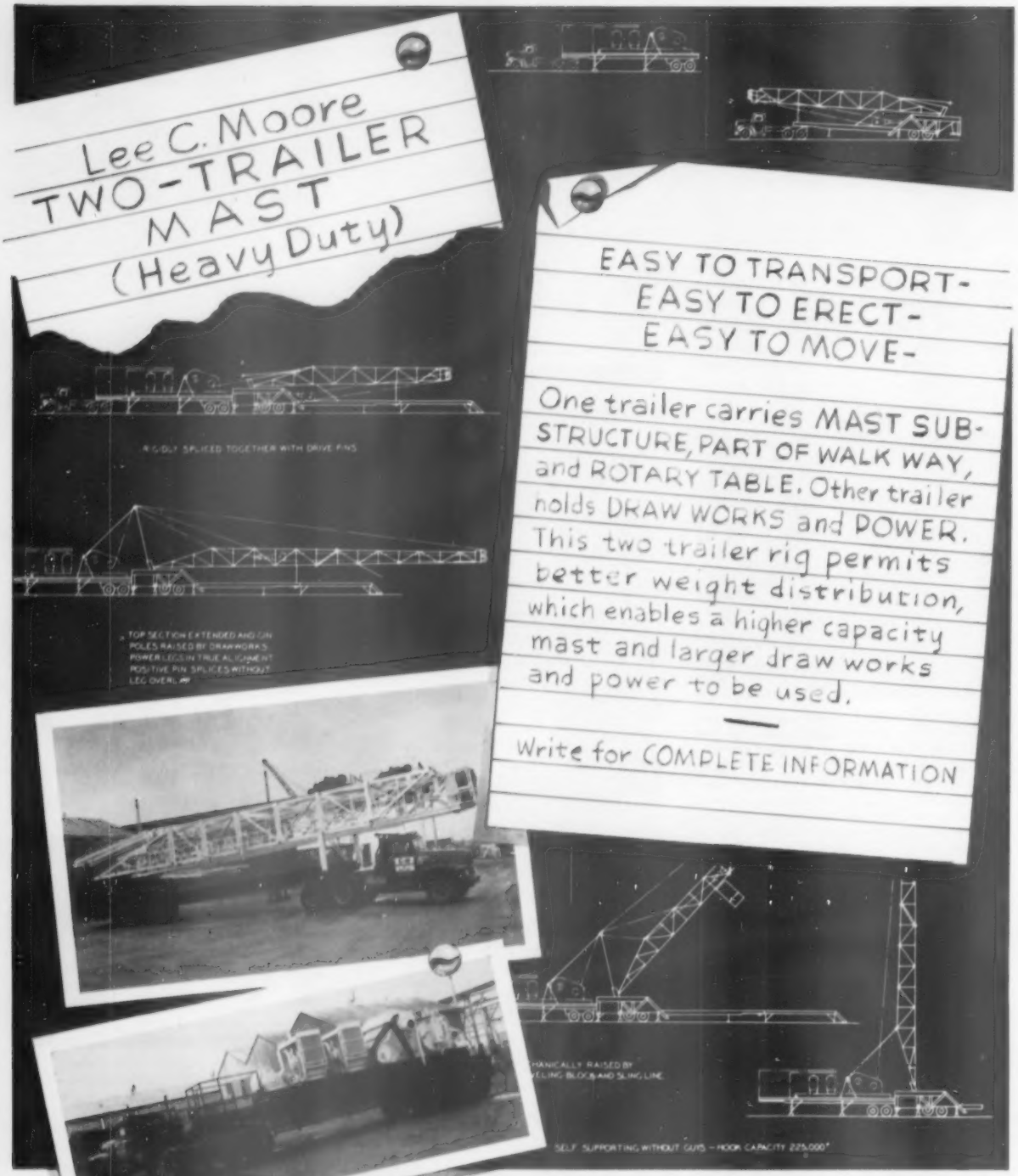
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EXPLORATION

Sara . . . Largest Devonian Structure?

by Frank J. Gardner

S IS for Southland, A is Atlantic, R is for Rowan, A for Amerada. Put them all together, you have SARA—full name Sara Devonian, newest of the new in Permian basin oil strikes. And present indications are that Sara is out to capture production prizes for the West Texas Devonian oil play.

Situated in the southeast corner of Gaines County, the field was discovered on March 8, by Amerada Petroleum Corp., Southland Royalty Co., Atlantic Refining Co., and Rowan Oil Co. 1 Stanton Brunson (B on map). First, it was called "Amrow," after the operator and drilling company, but a combination of first initials seemed more to the point, and Sara came about. The discovery was completed in Devonian pay at 12,674-12,728 ft. for an initial potential of 1,868 bbl. oil per day.

The past week brought important news from a well 1½ miles northeast of the Brunson discovery: Felmont Oil Co., Signal Oil & Gas Co., and Stanolind Oil & Gas Co. 1 Terrell County School Lands (A on map) flowed at a rate of 3,360 bbl. per day from the Devonian at 12,700-35 ft. on its second drill-stem test of that formation. On the first test, at 12,674-12,700 ft., it had already tested 2,592 bbl. per day *(The Oil and Gas Journal, May 31, 1954, p. 56).*

On the new test, operators left the tool open for 1 hour and 53 minutes, using a 2,700-ft. water blanket. With blanket surfacing in 25 minutes, oil appeared 23 minutes later, and after cleaning for 5 minutes, the well was turned into tanks for 1 hour through a 1-in. top choke and ⅝-in. bottom choke. During the first 30 minutes, flow was gaged at 66.49 bbl., increasing to 73.46 bbl. the last half hour. It then reversed out 180 bbl. oil for a total recovery of 319.25 bbl. oil, with no water. Flowing pressures of 3,800 to 5,250 psi. were recorded, with a 15-minute build-up pressure of 5,450 lb.

Devonian Tested

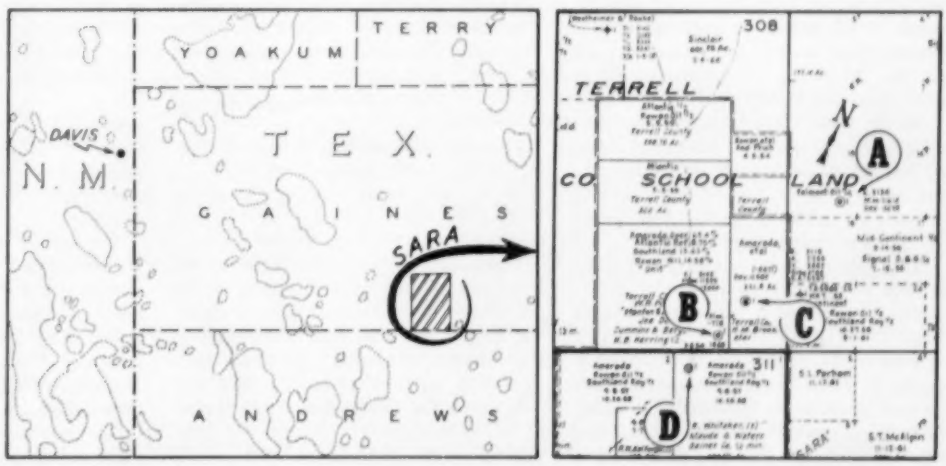
Felmont, as operator, now is deepening the 1 Terrell for a third drill-stem test of the formation. If the new producer proves to be on the same anticline with the Sara discovery well on the Brunson farm (and present information indicates that it is), then West Texans shall have witnessed the birth of another great Permian basin field, and perhaps the discovery of the largest Devonian structure yet uncovered in the basin.

The original Brunson discovery well topped the Devonian at 9,492 ft. subsea; the new extension by Felmont found the top at minus 9,549 ft. Between the two, at C on the map, Amerada et al 1 Terrell County School Lands has topped the formation at 9,471 ft. subsea, 21 ft. higher than the discovery well (B) and 7 ft. higher than the Felmont extension well (A). This middle well, 1 Terrell, has made a first drill-stem test at 12,610-715 ft. and recorded a flow of 38 bbl. per hour.

To the southwest, at D on the map, Amerada 1 Whitaker, a southwest offset to the Sara discovery, checked out higher on top of the Spraberry than did the Brunson well; if it holds this position down through the column, it may prove to be higher on the top of the Devonian than any other well in the area. Late reports have this southwestern test drilling ahead and approaching 10,000 ft.

The shaping up of this prolific new deep field emphasizes the growing importance of the deep potentialities of the Permian basin and adds impetus to the Devonian search over a wide area. Only a couple of weeks ago, Jake L. Hamon and Warren Petroleum Corp. 1 Federal-Davis (northwest corner of map) completed in the Devonian at 12,140-71 ft. for 729 bbl. of oil per day. The news that these operators now have staked three new 12,250-ft. confirmation tests in that area for a further probe of the Devonian foreshadows an increased tempo of drilling throughout the basin during the coming months.

D is for Devonian. S is for Sara. T is for Texas. Put them all together, and you have quite an imposing series of DST's.



Permian basin exploration activity has been stimulated by two large Devonian discoveries: the Davis area in eastern Lea County, New Mexico, and Sara field in southeastern Gaines County, Texas.

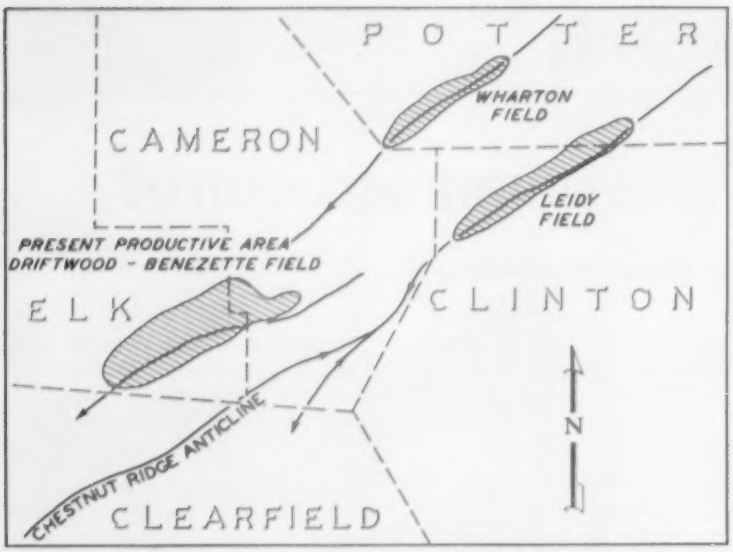


Fig. 1—Gas production from the Oriskany sand at Leidy and Driftwood-Benezette fields in North Central Pennsylvania occurs along prominent anticlinal trends.

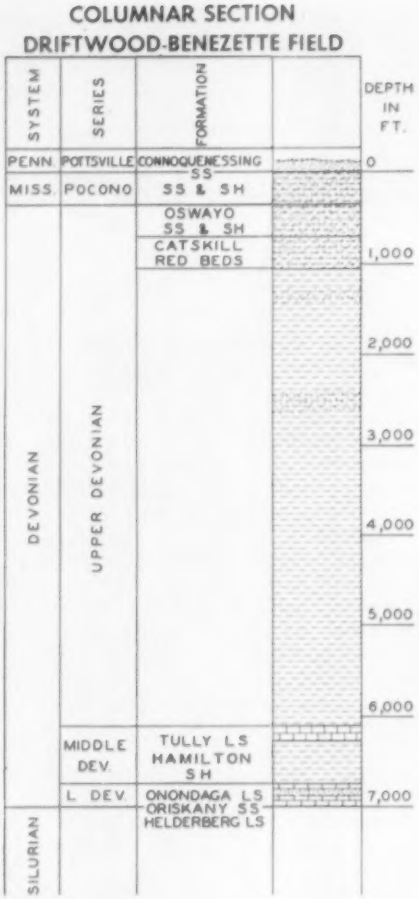


Fig. 2—The Oriskany sand varies in thickness from 12 to 14 ft. and underlies the entire area. Recently wells have been completed using gas as the drilling medium.

High Gas Prices Started it...Now

75 Rigs Active in One Pennsylvania Gas Field

by Carl H. Roberts and Thomas D. Hessin

HIGH gas prices of 27½ cents per M.c.f. have brought about a rapid development of Leidy gas field in north-central Pennsylvania since its discovery in 1950. The three-county area of Clinton, Cameron, and Elk has been the scene of an extensive exploration and development drilling campaign that led to the discovery of Driftwood-Benezette gas field in 1951.

In the past 4 years there have been 371 field wells drilled with 282 completed gas wells and 89 dry holes. At the present time the drilling activity is centered in the Benezette area where 75 rigs are active (Fig. 1).

The producing formation in all fields is the Oriskany sandstone of lower Devonian age and it varies in thickness from 12 to 40 ft. in the gas wells.

Both fields are located in the plateau region of Pennsylvania, an area of flat-topped mountains dissected by deep, steep-sided valleys, with a maximum relief exceeding 1,200 ft. The mountain tops are swampy and in the spring, travel is extremely difficult, and rig moving expensive.

Authors are consulting geologists, Coudersport, Pa.

Leidy Field

Discovery well in Leidy field was the 1 Dorsey Calhoun drilled by Leidy Prospecting Co.; it was completed early in 1950 with an open flow of 15 M.M.c.f. and a well-head pressure of 4,200 psi.

Development drilling extended from late 1950 to the summer of 1952. A total of 170 holes, ranging in depth from 5,600 to 6,400 ft., were drilled with 117 gas wells and 53 dry holes.

Open-flow gages of the wells ranged from several hundred thousand to an estimated 150 M.M.c.f., the latter being the largest gas well ever completed in the Appalachian area. Average open flow was approximately 7½ M.M.c.f.

Cumulative production from Leidy is 97 billion cubic feet and the productive area includes 12,000 acres. Maximum daily production exceeded 150 M.M.c.f. and at present the field is producing 6 M.M.c.f. daily. Five pipelines transport gas from the area, a 16-in. line, two 8-in., a 12-in., and a 6-in.

Major producers in the field are G. L. Cabot, Inc.; New York State Natural Gas Co.; John Fox; Leidy Prospecting Co.; Pipeline Construction & Drilling Co., and Plymouth Oil Co.

General geology . . . Leidy field is located on the prominent Chestnut Ridge anticlinal trend, that extends from the southern border of Pennsylvania to the northern.

Production has been developed for 14 miles along the crest of the anticline and for a maximum distance of 1½ miles northwest of the crest. Several pools have been developed on the southeast flank of the anticline; these are separated from the main pool by major faults.

The productive closure in the main pool above the gas-water contact is 443 ft. Apparently a great amount of this closure is caused by a pinching

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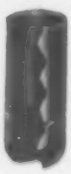

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out of the porosity and permeability of the Oriskany sandstone to the northeast rather than by a northeast plunge of the anticline. The dip of the Oriskany sandstone on the northwest flank averages 270 ft. per mile.

The southeastern flank is complexly faulted and this has resulted in a barren area 1 mile wide southeast of and paralleling the main pool. These faults are high-angle, reverse faults bounding a graben and horst. There is a maximum vertical displacement of the Oriskany sandstone exceeding 1,000 ft. between this faulted area and the main pool. There are, however, several prolific pools southeast of this faulting.

Drilling and completion practices . . . Most of the drilling in Leidy field was by standard cable-tool rigs, although several rotaries were active in the late stage of the development drilling.

Three strings of pipe were run in the wells, 10¾-in. to a depth of approximately 40 ft., 8⅝-in. water string to 600-800 ft., and a 7-in. production string which was set in the Onondaga limestone immediately overlying the Oriskany. The production string was generally cemented with 100-150 sacks of cement.

Rotary holes were drilled with water to the Onondaga limestone, where they either set pipe and were tailed in, or mudded up and drilled through the Oriskany. In the latter procedure the production string was hung in the Onondaga limestone.

Cable-tool wells were generally completed in from 90-120 days as opposed to 30-45 days with rotaries. The cost of completed wells varied from $50,000 to $75,000 depending on depth and type of drilling rig used. Cable-tool holes were drilled for $4-$5 per ft. and rotary drilling was on a day-rate basis of $900-$1,000 per day.

Driftwood-Benezette Field

Located in Gibson Township, Cameron County, and Benezette Township, Elk County, Driftwood-Benezette field is the largest Oriskany sandstone gas field discovered in Pennsylvania. It has been defined only on the north and northwest and proved productive area now includes more than 30,000 acres.

Discovery well in Driftwood pool was the Sylvania Corp. 1 S. C. Eaton; it was completed in September 1951 with an open flow of 2½ M.M.c.f. and a well-head pressure of 3,925 psi. Development in the area was slow because several dry holes were drilled northeast of the discovery well. Production was established southwest of the discovery well by Delta Drilling Co. and 3,000 acres became rapidly developed in 1952.

In December 1952 a wildcat test in Benezette Township, Elk County, 6 miles southwest of the Driftwood production, was completed as the discovery well of the Benezette area. This well, 1 Charleroi Mt. Club of Keta Gas & Oil Co., had an open flow of 3 M.M.c.f. and a well-head pressure of 3,950 psi.

Drilling Program Ending

Development drilling in Driftwood pool is essentially completed. A total of 62 holes were drilled of which 40 were producers and 22 were dry holes. Open flows of the producing wells ranged from several hundred thousand to 8½ M.M.c.f. The peak of production was in December 1952 with a daily average of 24 M.M.c.f. At the present time compressors are in operation and the production rate is 13 M.M.c.f. per day. Cumulative production from the 3,000 producing acres totals 11.2 billion cubic feet.

Development of the Benezette area has been very rapid, and as of March of this year 139 wells, ranging in depth from 6,100 to 7,000 ft., had been completed with 125 producers and 14 dry holes. Open flows ranged from 125 thousand to 40 million cubic feet and averaged 7½ million. For several months the daily production rate was 300 M.M.c.f. and at present the daily average is 260 M.M.c.f. Production figures to March 1, 1954, show a cumulative production of 59 billion cubic feet. Gas is transported from the area by one 16-in. and three 12-in. pipelines.

Major producers in Driftwood-Benezette field are Keta Gas & Oil Co., Delta Drilling Co., Sylvania Corp., New York State Natural Gas Co., Manufacturers Light & Heat Co., John Fox, Mid-Atlantic Gas & Oil Co., Devonian Gas & Oil Co., Fryer & Hanson Drilling Co., Fairman Brothers., Tennessee Producing Co., and Gross Associates.

Camp-Lot Development

The absence of regulating laws and the field price of gas pegged at 27½ cents per thousand cubic feet, have led to excessive drilling on camp lots in several areas. Most of the proved acreage in the area is owned by the State of Pennsylvania which receives a royalty ranging from .08½ to .17 cents M.c.f. No restriction is placed on production on state acreage and until recently none was placed on private land. However, a Department of Forest and Waters ruling is now in effect which limits the amount of gas that pipelines crossing state land can take from wells drilled on less than 15 acres.

General geology . . . Driftwood-Benezette field is located on the Driftwood anticline, an en echelon fold immediately northwest of the Chestnut Ridge anticlinal trend. The Driftwood anticline can be traced for 27 miles on the surface and has been proved productive for 16 miles.

Production in Driftwood pool is from a series of fault blocks bounded by high-angle reserve faults striking essentially parallel to the structural trend. The vertical displacement of the Oriskany sandstone does not exceed 100 ft. in the productive area.

High-angle reverse faults cut the Benezette area and strike essentially parallel to the surface crest of the anticline. The Oriskany is displaced vertically a maximum of 300-400 ft. adjacent to these major faults.

The productive closure in the Benezette area is 475 ft. Several hundred feet of this closure is afforded by a northeastern plunge of the Oriskany from the Benezette area into Driftwood pool. The remainder of the closure is apparently caused by a porosity and permeability pinchout of the Oriskany northeast of production.

Average rate of dip of the Oriskany on the northwest flank of the Driftwood anticline in the Benezette area is 120 ft. per mile.

Drilling and Completion Practices

Rotary drilling in Pennsylvania came into its own with the development of the Driftwood-Benezette area, and approximately 40 per cent of the development wells in the area to date have been drilled by this method.

Rotary holes are drilled with water to the Onondaga limestone which overlies the Oriskany sandstone. At this point, pipe is set and the well tailed in or the hole is mudded up, drilled through the Oriskany, and tested.

Currently Delta Drilling Co. is experimenting with air drilling under the surface pipe. Early indications are that this method may prove successful.

The total number of drilling days under the surface pipe for rotaries, varies from 25 to 35 days, as compared to 60 to 120 days for cable tools. Cable-tool holes are drilled for $6.00 to $7.50 per foot and until recently rotaries were on a day rate basis of $900-$1,000 per day. Many rotary contracts are now on a footage basis for an undisclosed amount. Rotaries use from 30 to 45 rock bits in drilling to total depth.

Considerable trouble with lost circulation is encountered by holes drilled at the higher elevations which penetrate Pennsylvanian and Mississippian formations.

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OKLAHOMA

Southeast Sunflower Stepout Establishes High Flow Rate

N. T. Smith 1 Schmidt, SW NW SW 16-14n-2e, Southeast Sunflower pool stepout in Lincoln County, has established a high flow rate of 20 bbl. of new oil per hour on 16/64-in. choke.

The ¾-mile stepout flowed 3 bbl. of oil per hour for 48 hours, natural. After fracturing it flowed back load at the rate of 60 bbl. per hour on ¾-in. choke.

Smith 1 Wiedemann, NE SE SE 17, is nearing its objective.

New Misener Pool Opened In Oklahoma County Area

A new Misener sand pool is being opened in Oklahoma County at Webster Drilling Co. 1 McNew, C SE SW 14-11n-1w.

The wildcat flowed gas in 4 minutes and oil in 30 minutes on drill-stem test taken at 6,109-17 ft. in the Misener. Volume of gas was estimated at 350 M.c.f. per day. Oil flow was estimated at 10 bbl. hourly. Nearest production is at McLoud pool, 5 miles to the east. Crews are preparing for production tests.

Oil Pay Confirmed at Chickasha Gas Field Well

In the northeast part of Chickasha field, Grady County, General Drilling Co. has extended oil production about ½ mile south of the first zone discovery well.

The McCaughtry "A," NE NW NW 35-5n-8w, flowed 302 bbl. of oil in 18 hours through ½-in. choke from perforations at 3,191-3,209 ft. in the Noble-Olson sand.

The oil pay in the field was opened at 1-A Farwell, SW SW SE 26, in April. The new-pay discovery flowed 174 bbl. of oil daily through ¼-in. choke. Closest Noble-Olson oil production is 3½ miles northwest.

APPALACHIAN AREA

OHIO

A second well, alongside a previous test that had a good oil showing, proved up a pool southeast of the city of Wadsworth. National Gas & Oil Co. 2 Gabriel Geig, Lot 10. Wadsworth Township, Medina County, logging Clinton at 3,775-3,814 ft., made 60 bbl. with 175,000 cu. ft. gas in a 24-hour test after fracturing.

Indications of a Berea sand gas pool was found north of Senecaville in Richland Township, Guernsey County. Buc-Col., Inc. 1 Frank Newhart, Section 20, topped the sand at 1,325 ft. and finished at 1,330 ft. with a gage of 330,000 cu. ft. natural.

Allen Willey, et al, extended Hanover pool ⅜-mile to the west into Madison Township, Licking County. The 1 Russell Holman, Lot 7, made 100 bbl. in a 24-hour test after fracturing sand, found at 2,614-2,649 ft.

WEST VIRGINIA

Three rank wildcat locations were announced in West Virginia: Huntersville district, Pocahontas County, United Fuel Gas Co., 8176 Seth M. Chapman et al, elevation 2,429 ft., Warm Springs Quadrangle 1.30 miles south of latitude 38 degrees 05 minutes and 4.49 miles west of longitude 79 degrees

55 minutes. Plymouth district, Mercer County, United Fuel Gas Co., 8180 J. B. Eads, elevation 1,764 ft., Narrows Quadrangle 4.95 miles south of latitude 37 degrees 30 minutes and 1.13 miles west of longitude 80 degrees 55 minutes. Anthony Creek district, Greenbrier County, United Fuel Gas Co., 8240 M. T. Alderman, elevation 2,04[illegible] ft., Callaghan Quadrangle, 2.60 miles south of latitude 38 degrees 00 minutes and 2.75 miles west of longitude 80 degrees 05 minutes.

PENNSYLVANIA

In Gaskill Township, Jefferson County, southwest Pennsylvania, Fairman Drilling Co., is building the rig at 1 Clair Reed wildcat, elevation of approximately 1,800 ft., Punxsutawney Quadrangle, 4.52 miles south of latitude 41 degrees 00 minutes and 3.34 miles west of longitude 78 degrees 45 minutes.

CALIFORNIA

Outpost Staked to New Oxnard Pool

Standard Oil Co. of California has staked 1 E. E. Lenox as an ½-mile south-extension attempt to the new basal-Sespe pool discovered last March at Oxnard, Ventura County. North and southwest offsets already are under way toward the 10,000-ft. pool, in SE SW 31-2n-21w. Standard is preparing to start a south offset, 1 Todd, to the McInnes pool discovery it recorded last July in NW NW 6-1n-22w.

The Lenox test will do much to determine importance of the 9,989-10,024 ft. oil sand uncovered by Lloyd Corp., Inc. 1 Livingston. The basal Sespe sand is believed to be a transition zone between the Oligocene and Eocene formations. In the discovery well its net thickness was 35 ft. Initial production of 1 Livingston was 610 bbl. of 32°-gravity crude daily through a 12/64-in. choke. Gas-oil ratios during the first week of production averaged about 1,350 cu. ft. per barrel.

New Gas Wildcats

Three new gas tests are to be started in the Sacramento Valley area. Honolulu Oil Corp. will drill 1 Humble-Cauzza in 18-17n-1w, 3 miles south of Princeton field, in Colusa County. Signal Oil & Gas Co. is moving in equipment to drill 1 Monterey-Bell in 4-11n-1e, in the Dunningan area of Yolo County. In the latter's Pleasant Creek area, 4-8n-1w, Ohio Oil Co. is planning 1 W. R. Chapman.

General Petroleum Corp. is well along toward drilling the deepest test ever made in this northern gas producing area. In the Saxon area, Yolo County, 10-7n-3e, its 1 Glide-Court is drilling below 13,300. Only Standard of California 1 Young Community, about 65 miles southeast, in 34-3s-8e, has reached a greater depth. Last year it was dry at 13,683 ft.

Eocene Test for Tejon

General Petroleum Corp. has set surface pipe at its wildcat in the Sand Hills area, 20 miles south of Bakersfield. The deep test, 16-3 S. P.-Tejon, in NW SW 3-11n-19w, is expected to go to the Eocene in search of production. It is about 4 miles southeast of the deepest test ever made in southeast San Joaquin Valley, Western Gulf Oil Co.'s 15,092-ft. dry hole drilled in 1947. Nearest

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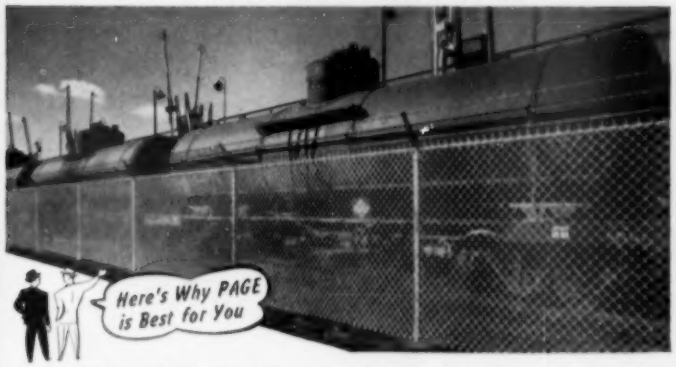

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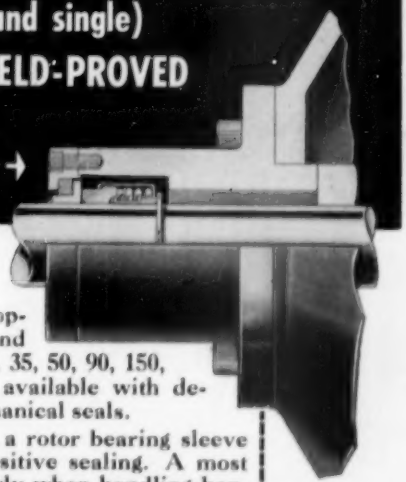

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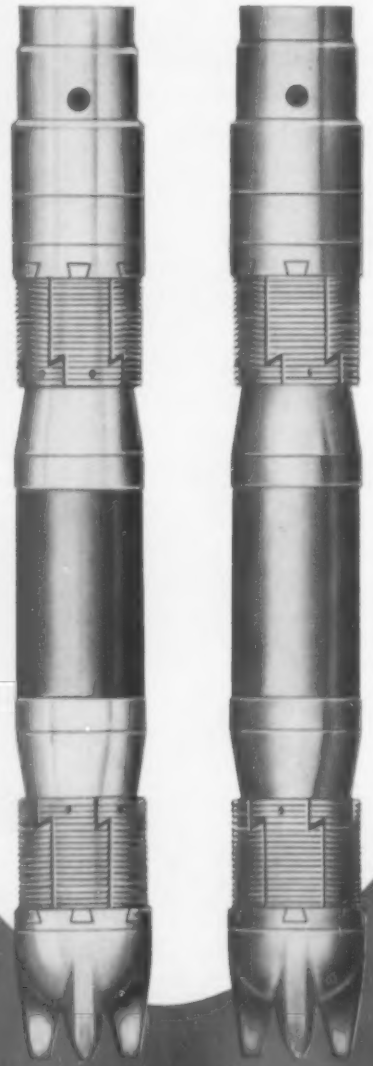

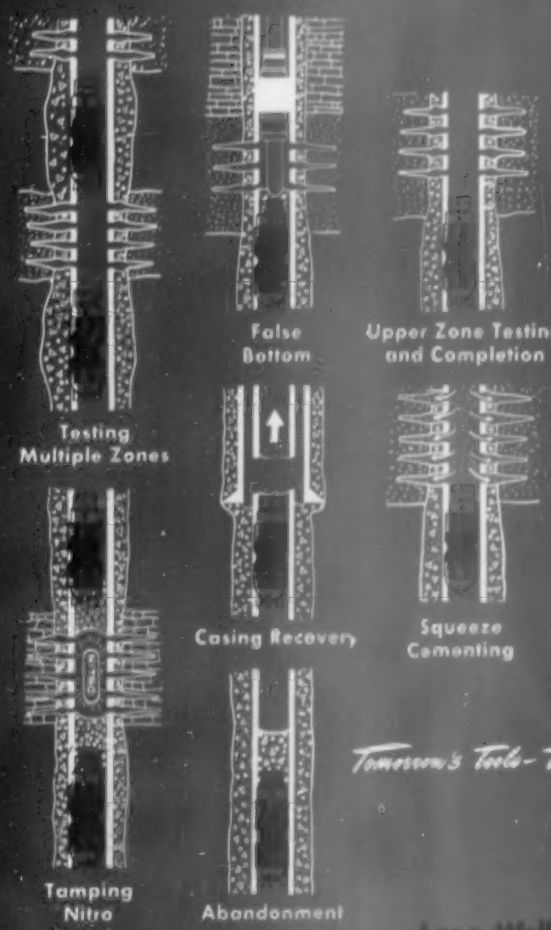

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production is the 6,900-ft. discovery made by Union Oil Co. last year in NE SW Section 24.

Imperial Test Dry

The Texas Co. abandoned 1 Stone in the Edom Hill are of Riverside County after drilling to 7,474 ft. The wildcat was in 35-3s-5e, about 60 miles northwest of the northernmost of four dry holes drilled by the company in Imperial County in 1951 and 1952. No further drilling has been announced by the company.

MICHIGAN

Two-Mile Oil Extension Indicated at Northville

Either a 2-mile northeast extension of the Northville Trenton oil pool or a new field was in prospect this week as Ferguson & Ferguson 1 Malley, NW SW NE 32-1n-8e, Novi Township wildcat, Oakland County, showed from 2,000 to 2,400 ft. of free oil from Trenton in 17 minutes. It had a gas head estimated good for about 750,000 cu. ft. per day. The well was cased, with pay at 4,487-97 ft., in preparation for clean-out, test and completion.

Location is 2 miles northeast of W. C. Taggart 1 LeMaster, Northville pool's flowing Trenton discovery. The well was drilled on a farm-out from Taggart, and the majority of the acreage surrounding it is under lease to Taggart. Well was reported to have been located on the basis of a gravimeter survey.

Trenton top was logged at 4,386 ft. Hole was drilled to 4,545 ft.

The Northville area already is the hottest development area in the state, with 18 tests either drilled, in process of being drilled or ready to start. On the basis of the oil show Alan S. Gray and Ray Whyte have contracted with Ferguson & Ferguson to move spudder about ⅞ of a mile north to start immediate drilling operations on the 120-acre Leone lease acquired immediately after oil showed in the 1 Malley. The 1 Leone is in the SW SW NE 29-1n-8e.

KANSAS

New Pratt County Strike Reported

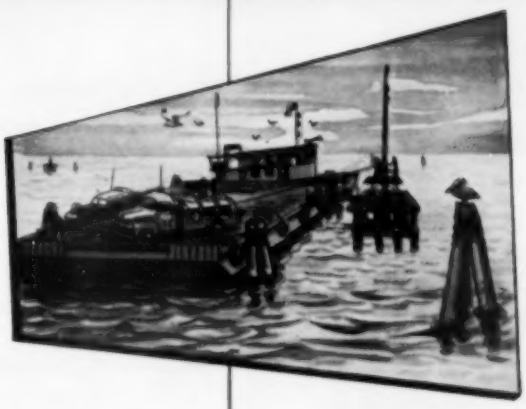
A new discovery has been reported in southern Pratt County, 2 miles north of new North Coats pool.

Lario Oil & Gas Co. 1 Moore, SW SW SE 36-28s-14w, 6 miles southwest of Pratt, gaged 67 M.c.f. of gas and recovered 1,590 ft. of clean 30.2°-gravity oil on a drill-stem test in the Lansing at 4,218-46 ft.

Testing Under Way at Harper County Discovery

Pickrell Drilling Co. and J. A. Mull, Jr., are testing fractured Mississippian perforations at 1 Campbell, NE NE NE 36-31s-9w, 1 mile south of South Grabs pool in the northwestern part of Harper County.

The well swabbed 50 bbl. of oil natural in 11 hours. Perforations were in the Mississippian at 4,368-88 ft.



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MONTANA

Second Brorson Test to Be Completed in Madison

Sun Oil Co. and Phillips Petroleum Co. are completing 2 Dynneson, C SW SW 29-24n-58e, in the Brorson area, Richland County.

The well was intended as a confirmation of the Ordovician discovery in this area. Shows were found in Madison, and, after extensive testing, completion will be as a Madison discovery at 9,128-9,220 ft. After treatment of this zone, flow was at the rate of 126 bbl. of oil per day, with a small amount of sediment cut.

The Madison discovery is 1½ miles northwest of Ordovician discovery well, which also had Madison shows.

Commercial production in Madison in this area, east of the Cedar Creek anticline and away from known surface structures, is expected to spur further exploration in the area.

Phillips County Wildcats

Chicago Corp. and Republic Natural Gas Co. have made location for two wildcats in the Whitewater Creek area, Phillips County. First to be drilled will be 1 Government-Holly, NE NW SW 2-35n-30e. The other is 1 Government-U. S. Smelting, SE NW SE 31-35n-31e, Both will test to Devonian about 4,500 ft.

Hill County Wildcat Shows

Dekalb Agricultural Association, Northern Oil Division, pulled bleeding cores from the Sawtooth at 1 Meland, C NW SW 21-35n-13e, in the Cottonwood area, Hill County. Test at 3,799-3,835 ft., flowed water in 2 hours. Another test, at 3,798-3,826 ft., recovered 300 ft. of 5 to 10 per cent oil and gas-cut mud, and 2,185 ft. of slightly oil and gas-cut fresh water. Operator is drilling below 3,835 ft. Top of Sawtooth was at 3,775 ft.

New Daniels County Test

S. H. Hunt has location for 1 Lindquist, C NW NW 10-34n-49e, Daniels County. The well will test Winnipeg around 10,100 ft. This well is 11½ miles east of Hunt's wildcat in the Silver Star area of this county, which is reported drilling below 8,700 ft.

Cut Bank Stepout to Test

Heep Oil Co. is running casing at 1 Harwood, C SE SE 14-31n-6w, in Pondera County. The well topped Madison at 3,331 ft., and recovered 113 ft. of oil and gas-cut mud on test of the zone 3,331-55 ft. It is about 1½ miles south of nearest production.

SOUTH DAKOTA

Fox Hills Wildcat Testing

Stanolind Oil & Gas Co. is swabbing at 1 Clark, NE NE 11-22n-2e, in the Fox Hills dome area of Harding County. Reports of shows, both in Red River and Madison have not been confirmed by the operator. Casing was landed at 8,685 ft. and perforated at 8,568-8,612 ft. The well is about 12 miles northwest of Red River production at Shell Oil Co.'s Buffalo area discovery, same county.

Stanley County Wildcat

Shamrock Oil & Gas Co. has location for 1 Barrick, SE SE 29-8n-27e, Stanley County. Location is on a 37,637 acre block. Objective is about 3,900 ft.

NORTH DAKOTA

Pierce County Wildcat

Cardinal Drilling Co. has location for 1 Bell, SW NW 27-158n-72w, Pierce County, on farmout from General Oil Corp., of Bismarck. Ajax Oil Co. drilled a 5,383 ft. dry test in the area in 1951.

Two New Wildcats Staked

W. H. Hunt has spudded 1 Horne, SE NW 14-156n-92w, Mountrail County, and 1 Newmann, SW SE 33-152n-82w, in Ward County. These are the last two of a series of five wildcats drilled by this operator on farmout from Stanolind Oil & Gas Co., and The California Co.

WYOMING

Carbon Discovery Tests

McElroy Ranch Co., Natural Gas & Oil Corp., and Bruce Anderson are running casing at 2 Horne, NE NE SW 11-20n-79w, in the South Big Medicine Bow area, Carbon County. Test of approximately 36 ft. of saturation in Muddy sand flowed oil after 11 minutes. Test was of the zone 5,341-55 ft. Flowing pressure was 950-1,150 psi. Oil recovered is about 40° gravity. The well is about 2 miles south of production at Big Medicine Bow. It was scheduled as a test of Sundance.

North Fork Test

Stanolind Oil & Gas Co. is drilling below 1,500 ft. at 2 Unit, C NW NW 30-44n-81w, in the North Fork Unit, Johnson County. It is the first well drilled in the area since Stanolind completed the Tensleep discovery in 1951 for a flow of 173 bbl. of oil daily. The unit was approved earlier this year.

Lincoln County Gas Show

El Paso Natural Gas Co. and Continental Oil Co. are coring below 11,302 ft. at 1 Fontenelle Unit, W½ SE NW 11-24n-113w, Lincoln County. Gas shows were reported in samples from 11,298 to 11,302 ft. Top of Dakota was called at 11,175 ft.

NEVADA

Casing Run In Nye Test

Shell Oil Co. has plugged to 6,756 ft. and is running casing at 1 Unit, SE NE NW 35-9n-57e, in the Eagle Springs area. Total depth is 10,358 ft., with granite topped at 10,330 ft. The well apparently had commercial oil recoveries on tests from 6,450 to about 6,800 ft. It is the state's first indicated success.

COLORADO

Slater Wildcat Gets Shows

Quintana Production Co. tested gas at an estimated rate of 4,000,000 to 5,000,000 cu. ft. per day at 1 C. F. & I. Corp., NE SE SW 13-12n-89w, in the Slater Dome area, Moffat County. Test was of the zone 2,502-20 ft. Tool was open 7 minutes, and pipe recovery was 200 ft. of heavily oil and gas-cut mud.

Another test 2,524-44 ft. flowed at an estimated rate of 3,000,000 cu. ft. per day. Pipe recovery, after 50 minutes, was 720 ft. of gas-cut oil and 15 ft. of water. The operator is reported running casing to present depth of 3,100 ft., and will drill ahead to the original objective. Recoveries are believed from Mesaverde. The well is about 8 miles southeast of a small Mesaverde discovery at Savery unit, completed earlier this year.

Blanco Wildcat Shows Gas

Carter Oil Co. has run casing to 5,085 ft. at 1 Ute, NE SW NE 23-32n-10w, in the Blanco area, La Plata County. The well flowed at the rate of 3,220,000 cu. ft. of gas on test of Fruitland.

Rangely Test Abandoned

The Texas Co. has abandoned UPRR 70-32, SW NE NW 32-2n-102w, in the Rangely field, Rio Blanco County. The well was a scheduled test of Madison, but went beyond this formation to a total depth of 9,360 ft. without encouragement. It was the first test below Pennsylvanian in the field.

ILLINOIS

Pool Well Makes Big Flow

Completion of a heavy flowing well in Boulder pool of Clinton County, in southern Illinois, has been reported by The Texas Co. The firm's 1 Speiser, 36-3n-2w, filled storage at the rate of 190 bbl. an hour from 6 ft. of Silurian pay at 2,024 ft., before being cut back to 16½ bbl. an hour.

In Christian County, H. F. Robison 1 Marshall, 13-15n-2w, tested 60 bbl. of oil an hour from the Silurian between 1,870-95 ft.

National Associated Petroleum Co. 1 Bircket, 11-1n-7e, reported a good show of oil in Aux Vases sand at 2,988-3,016 ft. and was running casing to test. If productive it will extend Clay City Consolidated pool to the southwest.

New Map

The Illinois Department of Registration and Education, State Geological Survey Division, has published a new map entitled "Preliminary Structure Map of the Trenton in Illinois." W. F. Meents (northern one-fourth after Leland Horberg). January 1954.

Blue-line print showing townships, ranges, and counties; contours show sea-level elevation on top of the Trenton at 100-ft. intervals. Size, 18 by 32 in. Order from Illinois State Geological Survey, Urbana, Illinois.

KENTUCKY

EASTERN KENTUCKY

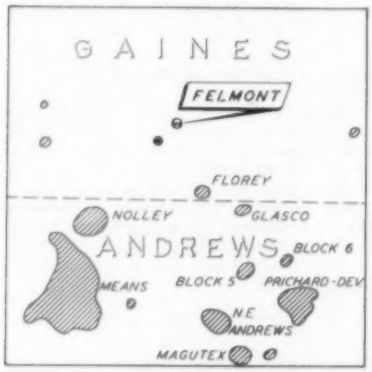
Raymond Long, et al have a dry hole at 1 Ollie Sargent 22-T-75 on edge of the town of Blairs Mills, in Morgan County. This was a wildcat test in the northern portion of the county. Important formation tops were: Weir sand, 714 ft.; Berea sand, 802 ft.; Devonian black shale, 885 ft., Corniferous lime, 1,157 ft.; total depth 1,315 ft. A slight show of oil was had in the Corniferous.

TEXAS

WEST TEXAS

Hockley Well Is Wolfcamp Discovery

Great Western Drilling Co. and Karl Hoblitzelle 1 Hines, Labor 23, Lease 736, State Capitol Land Survey, has been completed as a Wolfcamp discovery. Potential was 155 bbl. of oil a day, on the pump, from pay between 8,322-42 ft. and 8,382-8,418 ft., following mud-acid treatment. Location is 1½ miles north of Pennsylvanian Strawn production in Hoblitzelle field.



Gaines County Devonian discovery . . . Another flush Devonian producer was in prospect for southeastern Gaines County, at Felmont Oil Corp., Signal Oil & Gas Co., and Stanolind Oil & Gas Co. 1 Terrell County School Lands. Location in Labor 15, League 309, Terrell County School Land Survey is 13 miles southeast of Seminole, and about 1½ miles northeast of a recent flush Devonian strike by Rowan Drilling Co. and Southland Royalty Co. in League 308.

Felmont et al 1 Terrell CSL went into the Devonian, by samples, at 12,675 ft., minus 9,549 ft., and about 55 ft. low to the well in League 308. First drill-stem test was run from 12,674-12,700 ft., open 2 hours and 8 minutes, using 2,670 ft. of water cushion. The well started flowing the water blanket in 43 minutes, gas and oil-cut water in 58 minutes, and oil in 65 minutes. It was cleaned into pits for 3 minutes, then turned into tanks where it gaged 53.67 bbl. of clean oil the first 30 minutes and 54.8 bbl. the next 30. Flowing pressure ranged from 2,600-4,975 psi., and 30-minute shut-in pressure reached 5,425 psi. Total recovery, with no formation water, was 288.5 bbl. of oil. Operators prepared to deepen 35 ft. and test again.

Reeves County . . . Gulf Oil Corp. and Phillips Petroleum Co. 1 Toyah Unit, Delaware Basin test 7 miles northeast of Toyah, caused a stir of interest when it developed a small gas flow in the Devonian.

Top of the Devonian was 12,554 ft., minus 9,731 ft. First test was run between 12,558-12,626 ft., which had gas at the surface and recovered gas-cut mud. Gas volume ranged from 91,000 to 126,000 cu. ft. daily.

Operators cored ahead from 12,626-12,672 ft. and recovered 46 ft. of lime and dolomite with fractures and no shows of oil or gas. A test from 12,626-12,672 ft., open 2 hours, recovered 25 ft. of mud.

Reagan County . . . Another Ellenburger discovery was in sight for southeastern Crockett County. Cities Service Oil Co. 1-D Shannon, 15 miles southwest of the town of Big Lake, had flowing oil on a drill-stem test from 8,085-8,161 ft. Gas surfaced in 3 minutes, mud in 9 and oil in 11 minutes, and in 2 hours the well flowed 95 bbl. of 47° oil with no formation water. Gas-oil ratio was 2,480 cu. ft., and flowing pressure on the test ranged from 725-1,150 psi. Location is in Section 20, Block Q, EL&RR Survey.

NORTH TEXAS

Oil Creek Discovery in Eastern Cooke County

A new Oil Creek sand discovery was in prospect at L. O. McMillan and Kay Kimbell 1 Myrtle Cochran, 5 miles northeast of Callisburg.

The Oil Creek was entered at 7,111 ft., and a test from 7,111-17 ft. had gas in 38 minutes and developed 2,702 ft. of free oil. Bottom-hole shut-in pressure was 3,125 psi. in 20 minutes. Operators then drilled ahead and tested from 7,117-27 ft., but 30-minute recovery was 1,580 ft. of salt water with a slight oil show. Total depth was 7,159 ft.

Location in Gideon Rose Survey, A-848, is about 2½ miles northeast of production, and nearest Oil Creek production is in Walnut Bend field, 4 miles to the southeast. Sandusky field in Grayson County is 6 miles due east.

Nolan County . . . Woodley Petroleum Co. 1 McDonald, northeast offset to Penrose 1 Kirk, Wilberns or Ellenburger discovery in southern Nolan County, has had two successful drill-stem tests. Definite identification of the pay section had not been made, but field sources said if it were the same as Penrose 1 Kirk, the second well was running high structurally.

First test was from 6,233-48 ft., with the tool open 3 hours. Gas surfaced in 48 minutes and recovery was 600 ft. of clean oil plus 30 ft. of heavily oil and gas-cut mud. Bottom-hole flowing pressure ranged from 75-225 psi. Gas surfaced in 12 minutes from the interval between 6,248-63 ft., and recovery was 1,860 ft. of clean oil, plus heavily oil and gas-cut mud with no water. Flowing pressure was 925 psi.

Another Nolan County venture being watched is Humble Oil & Refining Co. 1 Petty, located west of Dora and 1⅜ miles north of the E. A. Cambrian field. Ordovician dolomite was topped at 6,085 ft., and a 40-minute test between 6,087-6,138 ft. had gas in 6 minutes and oil in 29 minutes. During the remainder of the test the well flowed at the estimated rate of 54 bbl. an hour, choke size not reported. Flowing pressure was 1,620 psi., and 20-minute shut-in pressure was 2,320 psi. From early studies, the well was thought to be in Ellenburger pay.

TEXAS GULF COAST

New Alco-Mag Producer Makes Large Gas Flow

Open-flow potential of Russell Maguire's latest completion in the comparatively new Alco-Mag area, 6 miles southeast of Humble, in northern Harris County, is calculated at 102,500,000 cu. ft. daily, the largest well yet completed in the area.

The well, 1 Scanian, 1,320 ft. south of the operator's discovery well, 1 Dooley, completed last October, flowed through adjustable chokes at the rate of 3,427,000 cu. ft.

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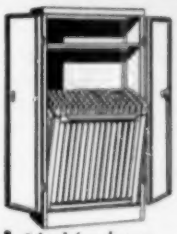
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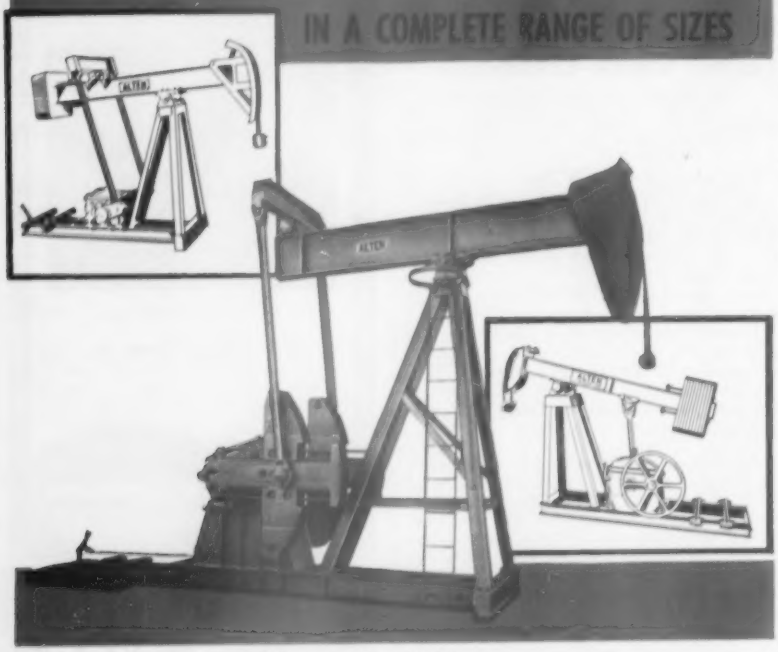

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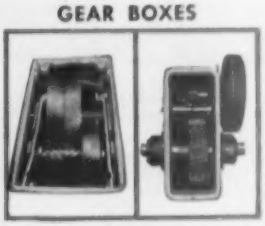

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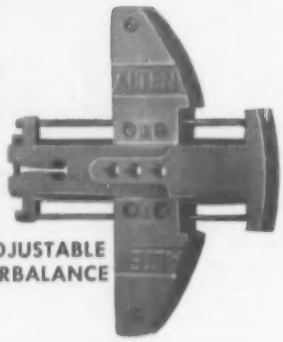

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of gas and 166.14 bbl. of condensate per day with pressure of 2,987 psi.

Producing interval in the area's Cook Mountain sand is 8,751-54 ft., approximately 200 ft. higher than in the discovery well. Hole was drilled to 9,028 ft.

Damon Mound Dry Hole Recompleted as Oiler

Bryant Drilling Co. has completed a good well on the southwest of Damon Mound, in Brazoria County, at its 1 Gulf fee, previously abandoned as a dry hole at 6,015 ft.

The well, perforated opposite a sand interval at 4,570-77 ft., produced at the rate of 107 bbl. of 28.6°-gravity oil per day on tests through 8/64-in. choke. Flowing pressures gaged 495 psi. with gas-oil ratio of 375 cu. ft. per barrel.

Bernard Area Extended

Gas-condensate production has been established in a semiwildcat test southeast of West Bernard field, in Wharton County. The test, 1 Border, drilled by Ada Oil Co., is rated good for 2,000,000 cu. ft. of gas daily, flowing through various chokes. Condensate spray was ungaged. Approximately 70 ft. of sand, topped at 7,085 ft., was logged. Total depth is 7,735 ft. Location is ½ mile from production.

TEXAS PANHANDLE

New Hansford Disovery Tests Morrow Gas Flow

Colorado Oil & Gas Co. 1 J. J. Steele is an indicated Morrow gas sand discovery in northeastern Hansford County, 6 miles southeast of the Hitchland field that produces from the Douglas. Operator set 5½-in. casing at 6,715 ft. after drilling to total depth of 7,590 ft. and perforated the interval 6,633½-42½ ft. opposite Morrow sand. The well flowed 3,140,000 cu. ft. of gas per day natural and, after 2,000 gal. of acid, gaged 600,000 cu. ft. per day. Nearest Morrow production lies 9 miles to the northwest at The Texas Co. 1 Blakemore, discovery well and lone producer.

SOUTHWEST TEXAS

Cambrian to Be Explored In Edwards Plateau Test

Taylor Oil & Gas Co. is preparing to drill a deep test in northwestern Edwards County, on the Edwards Plateau of southwestern Texas. The test, 1 Holman estate, is projected to the Cambrian, expected around 9,000 ft. Location, in Section 22, CCSD&RGNG Survey, is near the Sutton County line, about 27 miles south of Sonora, in the latter county.

LaSalle County Wildcat Completed As Producer

Potential tests at O. N. Beer's new discovery well, 1 Harris, 1½ miles northeast of Los Angeles, in LaSalle County, Southwest Texas, resulted in a flow of 55 bbl. of 41.7°-gravity oil in 24 hours. Flow was through 9/64-in. choke under pressure of 130 psi. with gas-oil ratio of 385 cu. ft. per barrel. Pay interval is 3,752½-59½ ft. in hole drilled to 3,838 ft. Location is in Block 1, I&GN Survey 40, A-424.

CANADA

Northwest Alberta Gets Dual-Zone Gas Discovery

A northwestern Alberta dual-zone gas-discovery has been made by Canadian Gulf Oil Co. at its Braeburn 16-19 wildcat, in LSD 16, 19-77-10w6, 28 miles east-southeast of Dawson Creek, B. C., and 11 miles east-southeast of Pouce Coupe area gas wells. Gas was found in both the Cadomin and Triassic formations. This well now is in the Permo-Pennsylvanian formation, and testing.

Cadomin was logged at 5,102 ft., or 2,464 ft. subset (K.B. elevation, 2,638 ft.), and drill-stem-tested from 5,100 to 5,125 ft., for 70 minutes. Gas flowed in 5 minutes at the rate 3,000,000 cu. ft. daily. Triassic was topped at 5,557 ft., or 2,919 ft. subsea. Initial test in that horizon was run from 5,551-71 ft. for 60 minutes. Maximum gas flow was 1,225,000 cu. ft. daily. Three other 60-minute, drill-stem tests in the Triassic gave the following results: At 5,569-80 ft., gas to surface in 4 minutes at rate of 3,310,000 cu. ft. daily; 5,580-90 ft. gas in 2 minutes at rate of 5,200,000 cu. ft. daily, recovered 15 ft. of oil-cut salt water, with trace of condensate; and 5,590-5,600 ft. gas at rate too small to measure, recovered 125 ft. of salt water. Tentative Permo-Penn contact is 7,250 ft., or 4,612 ft. subsea.

Buck Lake - Minnehik region . . . Near Pendryl, in the general Buck Lake-Minnehik region, 60 miles southwest of Edmonton, and 25 miles west of D3 oil wells at Westerose, Imperial Oil, Ltd., has discovered Mississippian gas. This strike, Imperial-Canadian Superior-Pendryl 4-22, LSD 4, 22-45-5w5, is on farmout lands which Imperial acquired from Canadian Superior Oil of California, Ltd. It is 8½ miles southeast of the Canadian Delhi et al-Minnehik 2 Mississippian wet-gas well, 11½ miles south-southeast of Viking and Cardium oil wells in the Minnehik-South Pembina region, and about 25 miles northwest of Homeglen D3 wet gas wells.

Mississippian was entered at 7,083 ft., or 3,713 ft. subsea (K.B. elevation 3,370 ft.) A 50-minute drill-stem test was run at 7,091-7,165 ft. Gas flowed at rate reaching a maximum of 4,500,000 cu. ft. daily. Recovery was 550 ft. of mud, and sulfurous salt water, believed primarily from drilling fluid and water cushion.

Southeastern Saskatchewan . . . Oil showings were obtained at Imperial-Federated Co-op-Palmer-North Portal 12-29, wildcat in the Pinto area. This well is in LSD 12, 29-1-5w2, 16 miles southwest of the Canadian Gulf-Canadian Devonian-Quinn 9 Mission Canyon oil discovery well, 4½ miles north of the North Dakota border, and 15 miles southeast of Estevan.

The well contacted the Mission Canyon member of the Mississippian at 5,587 ft., or 3,687 ft. subsea (K.B. elevation 1,900 ft.) It was tested from 5,745-65 ft. for 2 hours. There was a slight gas blow in 55 minutes, and pipe recovery consisted of 180 ft. of slightly mud-cut gassy oil, 120 ft. of gassy oil-cut mud, and 180 ft. of sulfurous salt water. Later test, from 5,775-85 ft., yielded 2,490 ft. of sulfurous salt water.

Redwater area . . . A Namepi Creek wildcat, 4 miles northeast of Redwater oil production, has found gas in four sand-zones. Last test in the bottom section of the basal Quartz gave up oil-cut mud. A 60-minute test from 2,570-2,610 ft., gave a fair puff, with recovery of 90 ft. of oil-cut mud, no water. Hole will go to top of D1 Devonian where casing will be set for deepening to the Cooking Lake. This well, Baysel-Namepi Creek 4-26, LSD 4, 26-58-21w4, found gas in two sections of the Blairmore, in a sand just above the basal Quartz, and in the latter formation. Gas flow rates, through ½-in. choke, ranged from 30,000 to 2,500,000 cu. ft. daily, between depths of 2,087 and 2,570 ft. Well is on an Imperial farmout being drilled by Bailey Selburn Oil & Gas, Ltd., and Selbay Exploration, Ltd.

Near Gibbons, 4½ miles west of Redwater field, Union-Imperial-East Gibbons 7-15, LSD 7, 15-56-22w4, tested in the basal Quartz at

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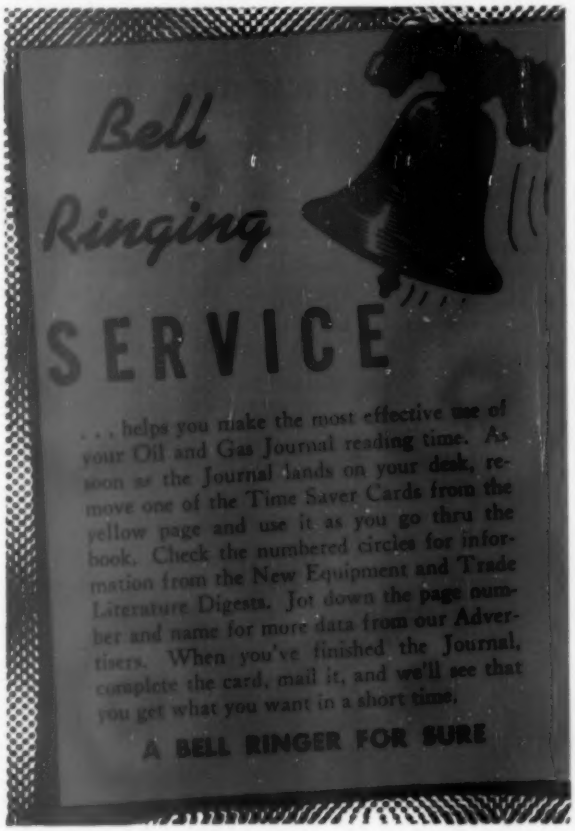
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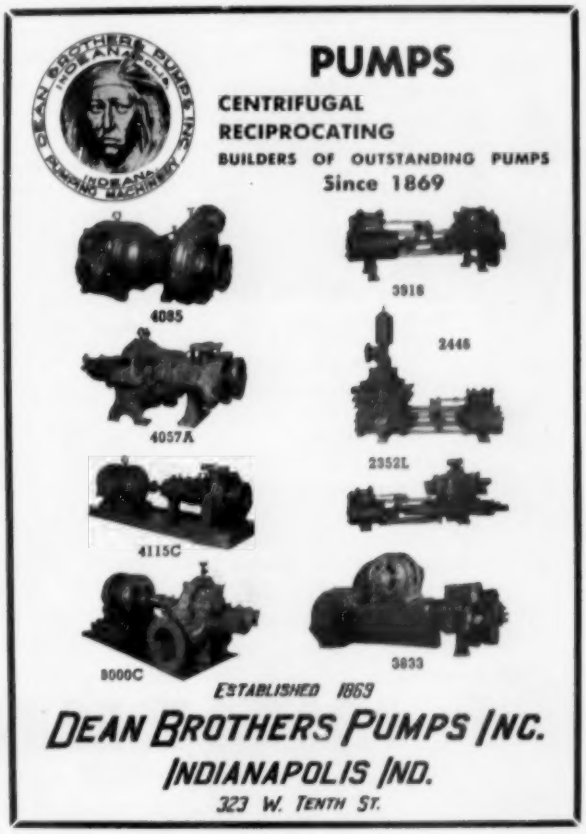

2,945-75 ft., for 25 minutes. Maximum flow-rate was 4,260,000 cu. ft. daily. Recovery was 200 ft. of salty sulfur water. There are an estimated 10 to 15 ft. of pay zone above the water.

Northeastern British Columbia . . . A gas well that rated a flow of 9,600,000 cu. ft. daily through a ¾-in. choke, is Pacific-Buick Creek 2, about 42 miles north-northeast of Fort St. John, and 16 miles north of Mile Post 80, on the Alaska Highway. It flowed from the Nikinassin member of the Cadomin with perforations at 3,688-3,770 ft. Interest in the well and 60,000 acre permit tract on which it is situated, is shared 75 per cent by Pacific-Peace River Natural Gas Co., and Sunray-Canadian Atlantic, and 25 per cent by Canada Southern, from whom the Pacific group acquired the farmout acreage.

MISSISSIPPI

Wilcox Sand Produces In New Wilkinson Discovery

Another Wilcox discovery, the third so far this year in southwestern Mississippi, is indicated in northern Wilkinson County, where Calto Oil Co. is testing oil showings encountered in its 4-A Crosby, a wildcat in the Pine Creek area, 2½ miles southwest of Darrington.

From pay interval at 7,093½-94½ ft., the prospective discovery well is reported to have flowed at the rate of 8 bbl. of oil per hour through ¼-in. choke with pressure of 100 psi. Bottom of the hole is 7,507 ft.

Location is 4½ miles southeast of Possum Corner field, also productive from Wilcox sand.

SOUTHEAST NEW MEXICO

Three Offsets Staked Around Devonian Discovery

Jake L. Hamon and Warren Petroleum Corp. have staked locations for three Devonian tests in the area of their 1 Federal-Davis, southeast of Knowles field in Lea County.

No. 1 Fannye M. Holloway, NW NE 13-17s-37e, is a southwest offset to the discovery; 1 Wilhoit in NW NW 18-17s-39e, is a direct east offset, and 1 R. K. Cone is in the SW SW of 7-17s-39e, which is a diagonal northeast offset. All tests were projected to 12,250 ft.

LOUISIANA

NORTH LOUISIANA

New Gas-Condensate Strike Reported in Lincoln Area

Feazel Interests et al 1 Mrs. W. E. Dowling, 19-19n-4w, Lincoln Parish, north-central Louisiana, flowed 221 bbl. of condensate daily plus 3,508 M.c.f. of gas through 18/64-in. choke, opening a new "D" sand Cotton Valley formation pool.

Perforations were at 9,212-28 and 9,203-09 ft. Gas-condensate ratio was 16,100:1. The new discovery is located about 3⅞ miles southwest of Hico-Knowles field. The discovery well is shut-in for pipeline outlet.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: H. J. Parker et al 1 Cowden, John Noble Sur. 1438, A-649. (Charlotte area). Dry. TD 5,213 ft.

H. R. Smith 1 Campbell, C. Mason Sur. 127, A-604. Dry. TD 6,510 ft.

Sutton Drilling Co. 1 Gray, W. M. Bomar Sur., A-114. Dry. TD 2,573 ft.

M. L. Wise and O. W. Killam 1 Fuller, T. R. Nichols Sur. 1046, A-645. Dry. TD 5,857 ft.

Gonzales County: Sutton Drilling Co. 1 Neighbors, Sarah Smith Sur., A-415. Dry. TD 2,206 ft.

Travis County: Nelson & Simmons 1 Nelson et al, P. C. Harrison Sur. Dry. TD 1,030 ft.

Wilson County: Sutton Drilling Co. 1 Stroud, M. Herrera Sur., A-132. Dry. TD 2,861 ft.

District 4

Duval County: J. W. Gorman 2 Adami, J. H. Gibson Sur. 341, A-265. Dry. TD 5,600 ft.

Nueces County: Christi, Mitchell & Mitchell 1 Crook, Section 26, Laureles Farm Tracts. IP 102.07 BOPD, 9/64-in., 30.1°, Catahoula 4,554-60 ft. (perforations). TD 10,052 ft. (New field—Southeast London).

Webb County: O. W. Killam 113 Bruni est., Block 51, San Ygnacio Subd., El Ranchito Pasture, Borregos Grant. Dry. TD 1,680 ft.

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WILDCAT COMPLETIONS

Willacy County: Ploymouth Oil Co. 1 Garcia-Dougherty, Block 7, Share 59, San Juan de Carricitos Grant. Dry. TD 8,510 ft.
Zapata County: Raymond P. Elledge, Jr., 1-A Trevino, Lot 11, Block 4, Mode Subd., Share 4, Porcion 3. Dry. TD 1,030 ft.

TEXAS GULF COAST
District 2

Bee County: Howeth & Mason 1 McGuill, J. A. Reed Sur., A-286. Dry. TD 4,007 ft.
Thomas Brothers 1 Benson, John & Dan O'Boyle Sur., A-45. Dry. TD 3,155 ft.
Calhoun County: Union Oil Co. of California 1 State Tract 40, San Antonio Bay. Dry. TD 9,669 ft.
Goliad County: R. O. Mangum 1 Hickle, Javiano Gomez Sur., A-125. Dry. TD 4,473 ft.
Karnes County: W. C. McBride, Inc., 1 Johnson, Carlos Martinez Grant, A-6. Dry. TD 5,940 ft.
Live Oak County: R. O. Mangum 1 Hoskins, Block 110, C. F. Simmons Subd., Sur. 225. Dry. TD 3,337 ft.

EAST TEXAS

Anderson County: Hunt Oil Co. 1 Carroll, W. M. Gibson Sur., A-343, 4 mi. SW Nechew field. Dry. TD 5,500 ft.
Cherokee County: Bill R. Tipton 1 Moody Estate, J. Musquez Sur., A-37. Dry. TD 4,408 ft.
Franklin County: McCauley & Parker 1 Barron, J. A. Wimble Sur., A-529. Dry. TD 4,103 ft.
Shelby County: W. A. Moncrief 1 Pickering Lumber Co., Thomas Haley Sur., A-305. Dry. TD 3,444 ft.
Wood County: Jackson & Duepree 1 Ziegler, J. B. Grant Sur., A-239. Dry. TD 7,868 ft.

SOUTHEAST NEW MEXICO

Chaves County: Cain & Adams 1 Lewis, 24-10s-25e. Dry. TD 1,289 ft.

TEXAS PANHANDLE

Hutchinson County: Phillips Petroleum Co. 1 Roberts, 5-T-104, T&NO. Dry. TD 3,880 ft. Geological wildcat.
Phillips 2 Brook, 5-T-105, T&NO. Dry. TD 3,880 ft. Geological wildcat.
Lipscomb County: Freeman 1 Ward, 43-107, H&TC. Dry. TD 4,012 ft.
Roberts County: Gulf Oil Corp. 1 McCoy, M-2, Sec. 14, H&GN. Dry. TD 4,300 ft. Geological wildcat.

WEST CENTRAL TEXAS

Callahan County: Johnson & Warren 1 Owen, H. G. Westfall Sur. 199. Dry. TD 2,149 ft.
Welch & Olsson Drilling Co. 1 Cutbirth, N. B. Johnson Sur. 223. Dry. TD 1,884 ft.
Coleman County: Davis Drilling Co. 1 Bozeman, 4-1-GH&H. Dry. TD 2,305 ft.
G. W. McCoy 1 Bowen, S. B. Savage Sur. 169. Dry. TD 3,032 ft.
Warren-Bradshaw Exploration Co. 1 Saunders, Sec. 7, HT&B Sur. Dry. TD 3,601 ft.
Haskell County: Bolin Oil Co. 1 Swenson Land & Cattle Co., Sec. 7, BBB&C Sur., A-568. Dry. TD 3,148 ft.
Jones County: Burt Oil Co. 1 Narrell, 46-16-T&P. Dry. TD 2,450 ft.
Neely & Neely 1 Gray, 176-1-BBB&C Sur. Dry. TD 3,815 ft.
Nolan County: J. W. King, Jr., and S. C.

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WILDCAT COMPLETIONS

Herring Drilling Co. 1 Boyd, 54-5-T&P. Dry. TD 7,214 ft. Ellenburger 6,164 ft., Cambrian 6,610 ft.

Sun Oil Co. 1 Everett, 70-1A-H&TC. Dry. TD 6,948 ft. Elev. 2,189 ft., Ellenburger 6,440 ft., Cambrian sand 6,928 ft.

Union Oil Co. 1 Young, 74-23-T&P, 12 mi. SW Sweetwater. IP 504 BOPD, 12/64-in., 3 per cent water, TP 125 psi., GOR 1,347 cu. ft., Strawn sand perforations 6,529-39, 6,582-6,602 ft. TD 7,152 ft.

Shackelford County: West Central Drilling Co. 1 Hendrick, 15-A-AB&M. Dry. TD 4,500 ft.

NORTH TEXAS

Archer County: Farmer & Horany 1 Davis, Blk. 11, A-54-BBB&C Sur. Dry. TD 1,094 ft.

Bill Lisle 2 Fitche, Blk. 34, Meade L. M. Pasture Subd. Dry. TD 1,471 ft.

Baylor County: C. P. Thurlkill 1 Vacek, Blk. 1 D&W Sur. Dry. TD 1,804 ft.

Clay County: G & R Drilling Co. 1 Warne Heirs, BBB&C Sur. 2, A-760. Dry. TD 1,957 ft.

Grayson County: Kay Kimbell 1 Godwin, M. Thornburg Sur., A-116. Dry. TD 5,366 ft. Elev. 794 ft., Ellenburger 5,256 ft.

Midwest Oil Corp. 1 Crockham, D. S. Southmayd Sur., A-1400. IP 240 BOPD, 36-in., 25°, TP 100 psi., GOR 610 cu. ft., Strawn 6,602 ft. TD 7,063 ft.

Jack County: Russell Maguire 1 Vantioner, I. Elde Sur., A-197. Dry. TD 5,985 ft. Elev. 1,080 ft., limestone 5,398 ft.

Knox County: Sid Perrymau & Oltex Drilling Co. 1 Kirkpatrick, Blk. 12, J. Garner Sur. Dry. TD 1,651 ft.

Montague County: Aries Oil Co. 1 Husband, Chas. Boger Sur., A-65. Dry. TD 7,075 ft. Barnett shale 7,020 ft.

Wichita County: Clyde Flick 1 Pitts Farm, 18-A-Denton CSL. Dry. TD 680 ft.

WEST TEXAS

Andrews County: The Texas Co. 1-B Texas-Mabee, 10-40-T2N-T&P, 20 mi. SE Andrews. IPP 52 BOPD, 42°, Wolfcamp 9,793 ft. TD 13,105 ft.

Vega Corp. 1 Gardner, 5-A35-PSL. Dry. TD 6,196 ft.

Borden County: Rowan Oil Co. 1 A. J. Long, 36-30-T4N-T&P. Dry. TD 8,706 ft. Elev. 2,384 ft., Dean 7,410 ft., Mississippian 8,585 ft.

Crockett County: Bankline Oil Co. & Hurt Oil Co. 1-41 Forristall, 41-31-H&TC, 11 mi. SE McCamey. IP 1,440 BOPD, ¾-in., upper Wolfcamp 6,294-6,330 ft., GOR 1,000 cu. ft., TP 270 psi.; IP 1,680 BOPD, ¾-in., lower Wolfcamp 6,187-6,218 ft., GOR 920 cu. ft. CP 225 psi. TD 6,517 ft.

Dawson County: Joe A. Humphrey 1 Billingsley, 12-34-T3N-T&P. IP 209 BOPD, ¼-in., 39°, GOR 825 cu. ft., TP 525 psi., Pennsylvanian 9,206-18 ft. TD 9,233 ft.

Garza County: Blanco Oil Co. et al 1-H Swenson, 68-2-H&GN. Dry. TD 7,460 ft. Elev. 2,479 ft., Canyon reef 7,194 ft.

Guy Mabee Drilling Co. 1 Justice Estate, 3-6-H&GN. Dry. TD 8,160 ft. Elev. 2,318 ft., Ellenburger 7,944 ft.

Howard County: Coronet Oil Co. 1 Collins, 40-31-T&P. Dry. TD 7,810 ft. Elev. 2,559 ft., Spraberry 5,600 ft., reef 7,748 ft.

Texas Crude Oil Co. 1-35 Jones, 35-33-T3N-T&P. Dry. TD 8,512 ft.

Texas Crude Oil Co. 1-12 Thompson, 12-31-T2N-T&P. Dry. TD 7,865 ft. Elev. 2,607 ft., reef 7,828 ft.

Texas Crude Oil Co. 1-34 White, 34-33-T3N-T&P. Dry. TD 8,504 ft.

Kent County: General Crude Oil Co. 100-1 Young, 100-G-W&NW. Dry. TD 7,364 ft. Elev. 2,166 ft., Canyon reef 6,730 ft.

Loving County: K. M. Regan 1 Timmins, 46-550-T2-T&P. Dry. TD 3,789 ft.

Lubbock County: Morris R. Antwell 1 Elliott, Sec. 24, Blk. J-S, EL&RR Sur. Dry. TD 5,648 ft.

Midland County: Cactus Drilling Co. 1 Nobles, 31-40-T1S-T&P. Dry. TD 5,075 ft.

Seaboard Oil Co. 1 Tillman, 12-X-H. P. Hilliard Sur., 2½ mi. N Midland. IP 108 BOPD, 21 BWPD, 46°, GOR 1,789 cu. ft., TP 400 psi., Pennsylvanian 10,368 ft. TD 12,700 ft.

Schleicher County: White Eagle Oil Co. 1 Wilton, Sec. 14, Blk. LL. Dry. TD 7,275 ft. Elev. 2,432 ft., Strawn 6,808 ft., Ellenburger 6,938 ft.

Sutton County: Bill L. Holland 1 Rieck, 29-C-GH&SA. Dry. TD 4,335 ft. Elev. 2,274 ft., Strawn 3,386 ft., Ellenburger 4,240 ft.

Orville Myers 1 Jones, 156-A-HE&WT. Dry. TD 2,325 ft.

C. L. Norsworthy, Jr., 1-A Reilly, [illegible]-TW&NG. Dry. TD 5,285 ft., elev. 2,470 ft., Strawn 4,105 ft., Ellenburger 4,340 ft.

Tom Green County: Texas Crude Oil Co. 1-3 Nasworthy, Sec. 3, S. B. Cogswell Sur. Dry. TD 6,110 ft.

Ward County: Homo Oil Co. 2-C University, 19-16-University Lands. IPP 21 BOPD, 35°, pay 2,824 ft. TD 2,838 ft.

NORTHERN NEW MEXICO

Rio Arriba County: Reading & Bates, Inc., 1 Duff, E½ NE SE 24-24n-1w. Dry. TD 8,453 ft.

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WILDCAT COMPLETIONS

ILLINOIS

Clay County: Don Slape 1 West, SW NW SE 22-4n-8e. IPP 47 BOPD, 6BWPD, TD 3,040 ft.

J. L. Black 1 Smith, NW NW SE 21-5n-5e. Dry. TD 2,523 ft.

Clinton County: Jet Oil Co. 1 Dadier, SW SW NE 18-1n-1w. Dry. TD 1,442 ft.

Jefferson County: Theodore Lindsay 1 Kirkpatrick Unit, NE NW SE 30-2s-4e. Dry. TD 3,138 ft.

Macoupin County: H. W. Knoche 1 Fee, NW SE NE 32-8n-7w. Dry. TD 613 ft.

St. Clair County: Hoiles Petroleum Co. 1 Peter, E½ NW 19-1s-8w. Dry. TD 130 ft.

Will County: Ralph Edwards 2 Gaskill, NW SW NE 29-35n-9e. Dry. TD 140 ft.

R. H. Edwards 1 Olson, SW NW SW 28-35n-9e. Dry. TD 114 ft.

INDIANA

Daviess County: White & Vickery 1 Sullivan, NW SW SE 15-4n-7w. Dry. TD 1,080 ft.

Dubois County: Henry C. Henderson 1 Voelkel, NW NW SE 18-2s-5w. Dry. TD 1,000 ft.

Posey County: Sun Oil Co. 1 Reynolds, NW SE SW 3-4s-13w. Dry. TD 3,939 ft.

Indiana Farm Bureau 1 Blackburn Commission, NE SW SW 2-6s-13w. Dry. TD 2,898 ft.

Sullivan County: R. G. Lowry 1 Gerkin, SW SE NW 5-6n-9w. Dry. TD 1,705 ft.

W. W. Dayton 1 Crowder et al unit, SW NW NW 28-8n-9w. Dry. TD 1,881 ft.

KENTUCKY

Christian County: Luther McIntosh 1 Jarman, NW SE SE 20-H-26. Dry. TD 761 ft.

Daviess County: Gus Poole 1 Green, NW NE SW 9-Q-30. Dry. TD 872 ft.

George S. Engle 1 Sandefur, SE NE NE 17-O-26. Dry. TD 2,437 ft.

MICHIGAN

Jackson County: Balser Cook 1 McArthur, SE SE NE 15-1s-3w. Dry. TD 1,916 ft. in Traverse lime.

Kalamazoo County: Ford Oil Co. 1 Segerdahl, NE NE NE 36-4s-12w. Dry. TD 1,147 ft. in Traverse lime.

Mason County: Dow Chemical Co. 1 Baker, S½ NW NW 3-17n-16w. Dry. TD 2,547 ft. in Dundee-Monre.

Muskegon County: Clifford A. Perry 1 Pustai, Sr., NE SE NE 19-9n-14w. Dry. TD 1,910 ft. in Traverse lime.

Newaygo County: Augie Busk and Carl E. Grimes 1 Vander Meulen et al, NE SE SW 8-11n-11w. Dry. TD 890 ft. in Marshall.

Tuscola County: Admiral Oil Corp. 1 Bedore, SW NE NW 10-14n-9e. Dry. TD 3,910 ft. in Richfield.

OHIO

Medina County: National Gas & Oil Corp. 2 Gabriel Geig, Lot 10, Wadsworth Township. IP 60 BOPD, Clinton 3,775-3,814 ft., TD 3,817. New pool.

Guernsey County: Buc-Col, Inc. 1 Frank Newhart, Sec. 20, Richland Township. IP 325 M.c.f. daily, Berea 1,325-?, TD 1,330 ft.

NEW YORK

Cattaraugus County: Hershberger 1, IP 86 M.c.f. per day, Red Medina sand. TD 4,118 ft. Flow was killed by caving after shot. Tools stuck. Well abandoned.

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WILDCAT COMPLETIONS

WEST VIRGINIA

Randolph County, Roaring Creek district: Nelson W. Taylor 1 M. J. Ford, elevation 2,655 ft., 792,000 cu. ft. gas, Fifth sand 2,275-2,328 ft., gas 2,282-2,284 ft., TD 2,334 ft.

Webster County, Glade district: Gregory Gas Co. 1 L. D. Smith heirs, 1,400,000 cu. ft. gas, Maxon sand 1,454-1,476 ft., gas 1,455-1,478 ft., TD 1,477 ft.

FLORIDA

Okaloosa County: H. L. Hawkins 1 Kelly, unsurveyed land in Township 2s-23w. Dry. TD 6,247 ft. Elev. 270 ft., Lower Cretaceous 6,190 ft.

ALABAMA

Coffee County: Seaboard Oil Co. 1 Strickland, C SW NW 33-5n-21e. Dry. TD 3,690 ft. Elev. 400 ft., Lower Cretaceous 3,405 ft.

Monroe County: Gulf Refining Co. 1-A Blacksher, 28-4n-6e. Dry. TD 6,302 ft. Elev. 199 ft., Lower Cretaceous 5,920 ft.

MISSISSIPPI

Franklin County: Dorris Ballew and John S. Callon 1 U.S.A., 25-6n-2e. Dry. TD 10,888 ft. Elev. 390 ft., lower Tuscaloosa 10,682 ft., Massive 10,888 ft.

George County: Sinclair Oil & Gas Co. 1 Luce, C SE NW 10-1s-6w. Dry. TD 8,308 ft. Elev. 262 ft., Lower Cretaceous 8,197 ft.

Hancock County: Sun Oil Co. 3 International-Alexander, 14-9s-16w. Dry. TD 10,003 ft. Elev. 27 ft., lower Tuscaloosa 9,322 ft.

Monroe County: Carter Oil Co., Gulf Refining Co., and Zach Brooks 1 Hall-Inger, SW SW SE 36-15s-7e. Dry. TD 5,514 ft. Elev. 325 ft., Mississippian 4,615 ft., Sanders zone 5,276 ft.

SOUTH LOUISIANA

Assumption Parish: Phillips Petroleum Co. 1-A Kittridge, 79-14s-14e. Temporarily abandoned. TD 14,397 ft.

Cameron Parish: Magnolia Petroleum Co. 1-A State Lease 1153, Block 110, West Cameron area, Gulf of Mexico. IP 335 BOPD, 12/64-in., 34°, Miocene 8,140-52 ft. (perforations). TD 10,628 ft. (New field).

Iberville Parish: Superior Oil Co. 55 Schwing, 74-9s-10e. IP 453 BOPD, 7/64-in., 43.6°, perforations 12,343-345 ft. TD 12,558 ft. (New pay and first oil production in Sullivan Lake field).

Plaquemines Parish: Continental Oil Co. 1 State Lease 977, Block 52, West Delta area, Gulf of Mexico. IP 1,862 M.c.f. daily and 25 BC per M.M.c.f., 11/64-in., Miocene 7,632-42 ft. (perforations). TD 11,000 ft. (New field).

St. Bernard Parish: The Texas Co. 1 State Lease 1940, Eloi Bay. IP 51 BOPD, 7/64-in., 26.9°, perforations 6.084-6,102 ft. TD 9,630 ft. (New field).

St. Landry Parish: Atlantic Refining Co. 2 Brewster - Neinstedt, 20-4s-6e. IP 600 M.c.f. daily and 40 BCPD, ¼-in., 54.1°, perforations 11,123-138 ft. TD 11,505 ft. (Extends Palmetto fietld).

St. Mary Parish: Magnolia Petroleum Co. 4-F State Lease 691, Block 119, Eugene Island area, Gulf of Mexico. IP 349 BOPD, 13/64-in., 38.2°, Miocene 7,265-71 ft. and 7,277-86 ft. (perforations). TD 8,630 ft. (New pay in Eugene Island Block 126 field).

Terrebonne Parish: Herman Brown 1 Continental, 6-18s-15e. Dry. TD 11,537 ft.

Vermilion Parish: Texas Crude Oil Co. 1 Albritton, 11-16s-1e. IP 1,500 M.c.f. daily with condensate spray, various chokes, perforations 12,398-406 ft. TD 12,759 ft. (New field).

NORTH LOUISIANA

Concordia Parish: Edwin L. Wilkens 1 Keith, 9-7n-7e. Dry. TD 5,510 ft.

Lincoln Parish: Feazel Interests, Southwest Gas Producing Co. and Hunt Oil Co. 1 Dowling, 19-19n-4w. IPF 221 BCPD plus 3,508 M.c.f. of gas per day, 18/64-in., GCR 16,100:1. "D" sand 9,212-28, 9,203-09 ft. TD 9,710 ft. (Gas-condensate discovery.)

Ouachita Parish: W. C. Feazel and Monla Gas Co., Inc. 1 Williams-slim hole. 7-18n-3e. Dry. TD 5,846 ft.

OKLAHOMA

Beckham County: Earl C. Ward et al 1 Van Vactor, SW NW NW 19-8n-21w. IPF 124 BOPD, Dolomite 1,492-1,522 ft., 39°, ¼-in. TD 1,553 ft. (Oil discovery.)

Cimarron County: Terminal Facilities 1 Sparkman "C," SW SW NE 32-5n-9eCM. IP 23,940 M.c.f. of gas per day. TD 4,775 ft. (Gas discovery.)

Cotton County: Picket-Christie-Stewart 1 English, NE NE SW SW 7-2s-10w. Dry. TD 2,405 ft.

Hughes County: J. T. O'Neal Drilling Co. 1 Wilbanks, NW NW NW 11-5n-9e. Dry. TD 860 ft.

Kay County: Union Oil Co. of California and Sunray Oil Corp. 1 Arterburn, SW SW NE 9-28n-5w. Dry. TD 5,620 ft.

Greeland Drilling Co. 1 Kennedy, SW SW SW 27-27n-4e. Dry. TD 3,225 ft.

Kiowa County: Noel W. Carbaugh 1 Strat-

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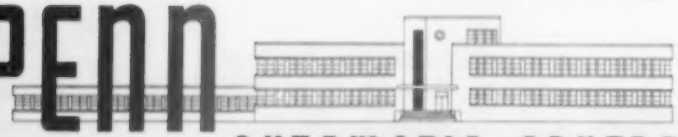

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FOREMOST IN THE INDUSTRY

WILDCAT COMPLETIONS

School Land, NW SW SE 24-6n-17w. Dry. TD 307 ft.

Lincoln County: An-Son Petroleum Corp. 1 Taron, NW NW NE 23-13n-2e. Dry. TD 4,009 ft.

M&M Drilling Corp. T. W. Eason 1 Johnson, SE SE SE 35-17n-4e. Dry. TD 4,100 ft.

Noble County: Fordee-Rhodes 1 Bentley, NW NW NW 6-20n-2w. IPP 250 BOPD, Wilcox 5,392-5,450 ft., 42°. TD 5,516 ft. (Oil discovery.)

Osage County: M. B. Schrier 1 Osage, SE SE NW 3-25n-7e. IP 23 BOPD, Lower Skinner 2,550-66 ft., 38°. TD 2,755 ft. (Oil discovery.)

Payne County: Gulf Oil Corp. 1 Molloy, SW NW SW 7-17n-4e. IPF 2,800 M.c.f. of gas per day, upper Skinner 3,670-84 ft., open flow. TD 4,479 ft. (Gas discovery.)

T. W. and J. M. Loffland, Jr. 1 State, SE SW NW 16-20n-2e. IPP 18 BOPD, Burgess sand 4,518-27 ft., Misener sand 4,761-64 ft. TD 4,920 ft. (Oil discovery.)

Rogers County: F. A. Smith 1 Sponsler, SW SE NW 9-22n-15e. IPP 4 BOPD, Miss. chat 1,046-59 ft. TD 1,059 ft. (Oil discovery.)

Tillman County: S. D. Johnson 1 Maguire, SW SW NE 3-3s-19w. IPF 140 BOPD, 4,952-62 ft., 49.8°, ⅛-in. TD 5,904 ft. (Oil discovery.)

KANSAS

Barton County: Schermerhorn Oil Corp. 1 Murten "A," SW NW SW 36-19s-15w. IPP 198 BOPD, Reagan sand 3,543-48½ ft. TD 3,562 ft. (New pay at Clarence pool.)

Butler County: White & Ellis et al 1 Benedict, CE½ NE SW 35-28s-7e. Dry. TD 2,515 ft.

Cowley County: Rex & Morris and CRA 1 Keilham, SW SW SW 21-31s-7e. Dry. TD 2,822 ft.

Ellis County: Pam-Kar Drilling Co. 1 Davis-Howard, SW SW SE 23-11s-20w. Dry. TD 3,780 ft.

Bankoff Oil Co. 1 Ruder, NW SW NW 4-15s-18w. Dry. TD 3,650 ft.

Finney County: Continental Oil Co. et al 1 Tate, NW SW NE 3-25s-31w. Dry. TD 5,170 ft. St. Louis 4,924 ft.

Greenwood County: Bedell & Catt 1 Lilley, SW SW NW 34-27s-9e. Dry. TD 2,590 ft.

Kingman County: Armer-Midstates 1 Davis, NE SE SE 32-29s-6w. IPF 144 BOPD, Kansas City 3,691-96 ft. TD 4,660 ft. (Opens Rosedale pool.)

McPherson County: W. L. Hartman 1 Root, NE NE SE 16-19s-5w. Dry. TD 3,475 ft.

Morton County: Huber 1 U.S.A. Gas Unit "C," 29-34s-43w. IPP 252 BOPD, Purdy sand (Pennsylvanian) 4,192-4,200 ft. TD 4,752 ft. (New pay and first oil producer for Morton County in South Greenwood field.)

Norton County: Berry & Fick 1 Baird, NE NW SW 13-5s-21w. Dry. TD 3,568 ft.

Pawnee County: National Gas & Oil 1 Stark, NE NE NW 24-23s-15w. IP 400 M.c.f. of gas per day, Sooy 3,908-19, 3,932-52 ft. TD 4,167 ft. (Opens Greenridge Northwest pool.)

Pratt County: Musgrove 1 Tatlock, NE NE NE 6-27s-15w. Dry. TD 4,843 ft.

Stafford County: Heathman & Seeligson 1 Brenn, NE NE SW 19-23s-13w. IPF 153 BOPD, Lansing 3,651-3,702 ft., 17°. TD 4,015 ft. (Opens Brenn pool.)

NEBRASKA

Garden County: Shell Oil Co. 1 Smith, C SE NE 10-15n-45w. Dry. TD 3,890 ft.

Kimball County: Superior Oil Co. 44-7 Gibson, SE SE NW 7-12n-54w. Dry. TD 6,211 ft.

CALIFORNIA

Kern County: Golden Bear Oil Co. 82-33 K.C.L., 33-29s-27e. Dry. TD 4,576 ft.

Rothschild Oil Co. 48 Tulare, 28-30s-22e, Oceanic sand 5,860 ft. Dry. TD 6,516 ft.

Superior Oil Co. 71-36 K.C.L., 36-30s-26e. Dry. TD 8,752 ft.

Los Angeles County: R. F. Oakes et al 1 Whittier, 22-2n-11w. Dry. TD 5,207 ft.

Madera County: Claud Clayton 1 Clayton, 5-10s-14e. Dry. TD 2,820 ft.

Riverside County: The Texas Co. 1 Stone (NCT-1), 35-3s-5e. Dry. TD 7,474 ft.

Santa Barbara County: Sunray Oil Corp. 1 Stow, 7-4n-28w. Dry. TD 2,250 ft.

Tulare County: Valley Oil Co. 1 Culver, 21-22s-27e. Dry. TD 1,096 ft.

Ventura County: The Texas Co. 1 Miketta, 21-2n-20w. Dry. TD 8,045 ft.

MONTANA

Musselshell County: Ryan Oil Co. and Davis Oil Co. 1 Putnam, C SE NE 14-10n-26e. Dry. TD 3,285 ft.

WYOMING

Hot Springs County: Sinclair Oil & Gas Co. 1 Redridge Unit, NW NW NE 15-46n-98w. Dry. TD 8,250 ft.

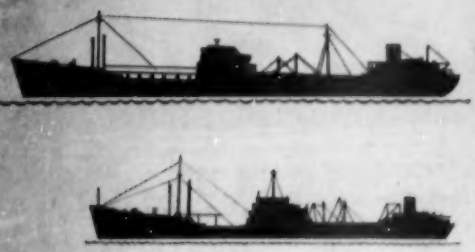
Johnson County: Aurora Gasoline Co. and Kingwood Oil Co. 2 Government, C SW SE 28-46n-82w. Dry. TD 5,575 ft.

Natrona County: Roden & McRae 1 Government-Dunford, NW NW Lot 17, 19-20n-80w. Dry. TD 3,750 ft.

Niobrara County: Great Plains Petroleum Co. 11-16 State, C NW NW 16-39n-66w. IP 30 BOPH, Dakota. TD 8,656 ft. (New field.)

TODAY'S TANKERS NEED BIGGER DOCKS

TANKER SIZE HAS GROWN



	1944	1954	1964
CAPACITY — BARRELS	150,000	250,000	?
LENGTH — FEET	510	625	?
BEAM — FEET	68	85	?
DRAFT — FEET	30	35	?
OFF-LOAD — BARRELS PER HOUR	5,000	15,000	?

Are your dock facilities adequate for loading and off-loading the new larger-size tankers?

We can help you solve this problem in the most satisfactory manner, having ample qualifications with 52 years of world-wide experience in the engineering and construction of harbors, docks and terminals.

The opportunity of discussing your needs and offering our experienced counsel will be welcomed. Please write.

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WILDCAT COMPLETIONS

UTAH

Grand County: D. W. Hancock 1 Government, C NE NW 21-17s-25e. IP 3,600 M.c.f. daily, Entrada. TD 4,131 ft. (New field.)

COLORADO

Logan County: British-American 1 Bollish, C NW NW 23-9n-53w. Dry. TD 5,052 ft.

Claycomb-Guida and New Drilling Co. 1 Kelley, C SW NE 25-9n-53w. IPP 200 BOPD, "J" sand. TD 4,920 ft. (New field.)

Ginther, Warren & Ginther 1 Mathewson, SW NE SW 12-9n-55w. IPP 51 BOPD, "J" sand. TD 5,485 ft. (New field.)

Gray-Humphries et al 1 Fluharty, C NE SE 19-10n-52w. Dry. TD 5,100 ft.

Herndon Drilling Co. 1 Henderson, NE NE SE 18-9n-51w. Dry. TD 4,794 ft.

Midwest Oil Corp. and Balderson Denver 1 Peavy, C SW NE 23-11n-55w. Dry. TD 5,495 ft.

Swedlund & Prince Brothers Drilling Co.-Rowland 1 Knowles, NE NE NW 30-8n-54w. Dry. TD 5,302 ft.

Morgan County: McMahon-Bullington Drilling Co. 1 Lind, SE SE NW 18-3n-58w. Dry. TD 6,023 ft.

Scott, Scott & Sheppard and W. E. Burnett 1 Osborn & Jess, SE SW SW 31-1n-57w. Dry. TD 5,910 ft.

Shell Oil Co. 1 Peterson, C NE SE 28-5n-55w. Dry. TD 5,116 ft.

Rio Blanco County: The Texas Co. 70-32 UPRR, SW NE NW 32-2n-102w. Dry. TD 9,360 ft.

Weld County: H. C. Arnold 1 Wyatt, C SE SW 9-11n-57w. Dry. TD 6,772 ft.

SASKATCHEWAN

Amurex-Canadian Southern 1-4 Kieville, LSD 4, 27-15-23w3. Dry. TD 6,348 ft.

Tide Water 13-11 North Dollard Crown, LSD 13, 11-8-20w3. Dry. TD 4,814 ft.

Imperial 7-29 Flaxcombe, LSD 7, 29-29-26w3. Dry. TD 2,720 ft.

Husky 2 Landrose, LSD 14, 22-50-26w3. Dry. TD 1,780 ft.

Tide Water 1 Mahon Crown, LSD 16, 4-13-12w3. Dry. TD 4,172 ft.

Phillips-Husky 13-14 Eastside, LSD 13, 14-29-29w3. Dry. TD 3,119 ft.

Phillips-Husky 1 Pinkham, LSD 10, 33-27-25w3. Dry. TD 3,280 ft.

ALBERTA

Seaboard et al 12-29-B Buck Lake, LSD 12, 29-45-7w5. Cardium oil well. TD 6,602 ft.

Gulf 5-14 Blue Ridge, LSD 5, 14-58-8w5. D-2 oil well. TD 7,650 ft.

Union-Imperial 7-15 East Gibbons, LSD 7, 15-56-22w4. Basal Quartz gas well. TD 3,500 ft.

Shell 7-8-A Beaver, LSD 7, 8-53-13w5. Dry. TD 6,571 ft.

Stanolind 1-F H. B. Pembina Crown, LSD 6, 34-47-8w5. Cardium oil well. TD 5,220 ft.

Shell 1 Home Sarcee, LSD 12, 6-23-3w5, Rundele gas well. TD 10,004 ft., PB 9,988 ft.

BRITISH COLUMBIA

Pacific 2 Buick Creek, Unsurveyed Territory. Mikinassin gas well. TD 6,000 ft. PB 3,770 ft.

Large Gas Well Extends Southeast Camrick Field

The rapidly developing Southeast Camrick field in southeastern Texas County, Oklahoma Panhandle, is being extended 2 miles to the northwest by a new well being completed by The Texas Co. with a calculated open-flow potential of 52,000,000 cu. ft. of gas daily from Morrow sand, perforated at 6,569-6,600 ft.

The extension well, 1-B Silsbee, in the NW NW SE 8-1n-19eCM, was drilled to total depth of 6,700 ft. and plugged back to 6,629 ft. in casing cemented at 6,663 ft. Pay zone was was fractured through the perforated producing interval. Gas flow carried an undisclosed amout of condensate.

Harper's Ranch Extended

Pure Oil Co. has extended Harper's Ranch field, in southeastern Clark County, southwestern Kansas, ¾ mile east at its 1 Harper, which flowed 533 bbl. of oil in a 23-hour gage through ½-in. choke. Pay is in Morrow sand, perforated at 5,435-55 ft. Location is in 2-34-21.

LEGAL

Notice is hereby given that sealed bids for oil and gas leases on approximately 8,040.85 acres of Tribal restricted Indian lands in Roosevelt and Daniels Counties on the Fort Peck Indian Reservation, State of Montana, will be opened at 2:00 o'clock, P.M., Mountain Standard Time, June 16, 1954, at the Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale may contact the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone, Poplar, 2181.

THE OIL AND GAS JOURNAL

"First my eye—we might have known some wildcatter beat us to it."

HIGHER RECOVERY
FASTER COMING TIME
FEWER TRIPS
DRILLING & SERVICE
DIAMOND WIRE LINE
CORE BARRELS
Now available in four sizes: 4¼" OD, 4½" OD, 5¼" OD, and 6⅛" OD to cut hole from 4½" diameter up.
Whether in slim-hole or conventional drilling, D & S Diamond Equipment for wire line coring will merit consideration.
TRUCO DIAMOND BITS
D & S CORE BARRELS
DRILLING & SERVICE

U.S. Honors Keeler

Federal position latest kudo for Cherokee chief

WILLIAM WAYNE KEELER took the courage and stamina of the American Indian, blended it judiciously with the resourcefulness of the American paleface, and parlayed the combination into success in the petroleum industry, recognition by his government, and the praise of his fellow men.

Known to nearly everyone as "Bill," Keeler, of Cherokee extraction, has been called by his 50,000 Oklahoma tribesmen "one of the greatest Cherokees in history and the strongest leader to appear among their people in more than 100 years."

The Government of the United States recognized his ability for the second time in a decade by appointing him chairman of the newly created Military Petroleum Advisory Board.

Some time ago, Phillips Petroleum Co. showed its appreciation of his 30 years' service by electing him vice president and member of the board of directors.

He started young . . . Keeler started with Phillips in 1924 as a 16-year-old, not yet out of his sophomore year in high school. In the summers before finishing high school, he gained experience in Burbank field and in the Bartlesville lab.

After high school he entered at the University of Kansas and didn't join the company again until his last years in college when he joined the staff of the Kansas City refinery.

From 1929 until 1943, Keeler worked in the company's refineries at Kansas City, and Odessa and Borger, Tex. In 1943 he was promoted to technical assistant to the vice president and in 1945 was named manager of all refinery operations. In 1947, he was elected vice president of refining and in 1951 reached his present position.

During World War II he served on the refining committee for the Petroleum Administration for War and also aided the United States Government in constructing a refinery for Petroleos Mexicanos in Mexico City.

Cherokee chief . . . Keeler has always been interested in the welfare and culture of the Cherokee people and in 1948 was elected vice chairman of the executive committee of the Cherokee Nation. On December 1, 1949, President Truman appointed him chief of the nation.

Among his accomplishments as chief has been the establishment of the Cherokee Foundation, which is interested in raising the social and economic status of the Cherokees.

When he isn't tied up with Phillips, the Government or the Cherokee Nation, Keeler likes to get in a little hunting and fishing on his Osage Hills ranch near Bartlesville.

While he has worked hard in the oil business, Keeler feels that he has come by his interest in oil naturally. His maternal grandfather, Nelson Carr, the first white settler in the Bartlesville area around 1870, noticed some of his cattle refused to drink from certain ponds in the area.

He reported this curiosity to John Cudahy, the meat packer, and Cudahy hired a geologist. After a few hours with his rocks, the geologist told Grandfather Carr, "Ain't surprised, the water's full of oil."

H. N. Seevers, formerly production superintendent for Chicago Corp. at Fort Worth, has been promoted to manager of production operations. Seevers joined the company in 1943 in the Corpus Christi district and was transferred to Fort Worth in 1952.

L. S. Melzer has been elected a vice president of Statex Petroleum, Midland, Tex. Melzer joined Statex as a geologist when the company was formed in 1950 under the name of State Exploration Co. of Texas. The name was changed in 1953. Before joining Statex, Melzer had worked for Stanolind Oil & Gas Co., and as a district geologist for Hancock Oil Co. at Midland.

Monty G. Martin has been appointed chief geologist for Texas Gas Transmission Corp. gas supply department at Shreveport, La. Martin has been chief geologist for Southwest Natural Production Co. for 2 years.

Kenneth G. Pearce has been appointed gas-gasoline superintendent for Tennessee Production Co. Pearce, a graduate of the U. S. Naval Academy, worked for Carter Oil Co., before World War II. In 1947 he joined Creole Petroleum Corp., in Venezuela as district supervisor of gasoline and in 1952 was named assistant manager of McKamie Gas Cleaning Co.

McFARLAND

R. S. McFarland, president of Seaboard Oil Co., has been elected chairman of the board of directors succeeding **John M. Lovejoy** who has retired. McFarland has been associated with Seaboard since 1931 and in recent years has been in charge of all of its field operations.

C. P. Boutte has been appointed chief engineer at Shell Chemical Corp.'s new plant under construction at Norco, La. Boutte, who will also serve as construction superintendent during the building, succeeds R. K. Walters, who has been appointed assistant manager of the manufacturing-engineering department in the company's New York offices.

H. C. Carrad, former head of the German and Austrian division in the European Area Department of Shell Petroleum Co. in London, has been appointed general manager of Shell Austria, A. G. **H. C. Langford,** formerly general manager of the Austrian company, has taken a position with Eagle Oil & Shipping Co., in London.

J. M. Fillman, formerly development engineer for Shell Oil Co. at Bakersfield, Calif., has been transferred to the company's New York headquarters. **R. A. Flohr,** who has been serving as a development engineer at Long Beach, is now in the area offices in Los Angeles. Other transfers include: **G. S. Kukuchek,** from Ventura to Salt Lake City as division mechanical engineer; **A. O. Spaulding,** from Ventura to Houston; **G. S. Holliday,** from

PERSONALS

Bakersfield to Ventura as mechanical engineer; and **Peter Wells,** from Los Angeles to Bakersfield as junior development engineer.

T. H. Barton, chairman of the board of Lion Oil Co., recently received an honorary degree of Doctor of Laws from Texas A.&M. College, his alma mater.

Billy B. Clifton, geologist with Lion Oil Co., has been moved from Wichita Falls, Tex., to Roswell, N. M.

Emilio G. Collado has been elected treasurer of Standard Oil Co. (N.J.).

Reese H. Taylor, president of Union Oil Co. of California, has been elected a trustee of the University of Southern California.

C. W. Sanders, manager of operations for Mendota Oil Co. and LaGorce Oil Co., Fort Worth, since 1951, has resigned to open a consulting office in Fort Worth.

Howard M. Herron, chairman of the board of California Texas Oil Co., Ltd., has retired. Herron, a veteran of oilfield work in Oklahoma in the early 1900's, joined Caltex as president in in 1936 when the organization was formed.

Sydney S. Smith, manager of Shell Oil Co.'s products pipelines department, received an honorary doctor of science degree from his alma mater, Marietta College, June 7. Smith is well known in the industry for his work in blending products in pipelines.

James W. Vater, Jr., has been transferred from Oklahoma City to Fort Worth where he will become chief petroleum engineer for F. Kirk Johnson. Vater had been serving as district engineer in Oklahoma City for Johnson before the move.

J. L. Baldwin has been promoted to manager of the operations department at Shell Chemical Co.'s new ammonia plant at Ventura, Calif. He succeeds **V. L. Keldsen,** who has been transferred to San Francisco as production manager of the ammonia division. **B. H. Pilorz** has taken over Baldwin's former duties as assistant manager. **C. B. Amspoker,** engineer formerly in the Martinez chemical plant, has been transferred to the company's New York offices.

Permian Basin Geophysical Society Meeting Speakers

The Permian Basin Geophysical Society recently completed its third annual meeting at Midland, Tex. Authors of the papers are: (seated left to right) J. H. Bartley, consultant; Homer I. Henderson, McCollum Exploration Co.; H. M. Thralls, Seismograph Service Corp.; B. F. Coker, United Geophysical Co. Standing are F. F. Reynolds, Seismic Explorations, Inc.; R. B. Rice, Phillips Petroleum Co.; Paul L. Lyons, president of the Society of Exploration Geophysicists, Anchor Petroleum Co.; John Daly, consultant, and Ben F. Rummerfield, Century Geophysical Co.

Frank A. Apgar has been named chief chemist with Aurora Gasoline Co. Before joining Aurora, Apgar served as a chemical engineer with C. W. Nofsinger Co.

Robert O. Lynch, geologist, has been transferred from the Fort Worth headquarters of W. A. Moncrief, independent producer, to Midland, to head the firm's newly opened office there.

John T. Sinclair has been elected president of Canso Oil Producers, Ltd., an oil production company formed recently when Canadian Southern Oils, Ltd., was divided into three separate concerns. Sinclair was formerly chief petroleum engineer for Pantepec Oil Co., C.A., in eastern Venezuela.

Ray A. Carter has been named president of Tuloma Gas Products, Stanolind Oil & Gas Co.'s new company for marketing liquefied petroleum gases. **Harry R. Thomas,** former superintendent of Stanolind's L.P.G. sales, was named vice president and general manager.

Harry A. Jackson, executive vice president of Tide Water Associated Oil Co., will receive a special 1954 industry citation at the annual dinner of the Automotive Division of the United Jewish Appeal of Greater New York. The presentation will honor Jackson for his concern for the welfare of the industry and for U.J.A.

Irv Dagan has been promoted to senior engineer with Standard Oil Co. of California. Dagan was formerly senior petroleum engineer.

M. L. Benedum, pioneer oil man, has been chosen "West Virginia's Son of the Year." Benedum was honored at a banquet presided over by **Sen. Jeff Neely** (D., W. Va.).

H. H. Bybee, Wichita Falls, Tex., has been appointed division geologist for Continental Oil Co., at Midland, Tex. **Max Levin** has been made district geologist and will take Bybee's place at Midland.

J. L. McCord has been elected president of Commonwealth Oil Co. McCord, who has been vice president of the company, succeeds **J. E. Fitzpatrick,** who is retiring.

Guy W. Wadsworth has been elected president and general manager of Southern Counties Gas Co. A veteran of 33 years with the company, Wadsworth succeeds **Arthur F. Bridge,** who is retiring.

W. M. (Bill) Decker of Cities Service Oil Co. has been elected president of the Oklahoma City Geological Society for 1954-55. Other officers elected were: **Osborne Prescott,** Shell Oil Co., vice president; **Cliff Branan,** Kirkpatrick Oil Co., secretary, and **Edward Barrett,** Continental Oil Co., treasurer.

PERSONALS

Thomas B. Garber joined United States Smelting, Refining & Mining Co. as a petroleum engineer with headquarters at Midland, Tex. Garber previously was with Standard Oil Co. of Texas.

J. Russell Sherman, executive vice president of Oceanic Oil Co., has been elected a director of the organization. Sherman has been with the firm since 1949 and executive vice president since 1951.

Louis P. Bristol has been elected president of the Murphy Oil Co. of Oklahoma, Inc., succeeding the late Michael E. Murphy. Bristol, who had been vice president of the company, has been associated with the Murphy interests for more than 30 years. His election marks the first time that the presidency has not been held by a member of the Murphy family.

Tom T. Jones has joined Kingwood Oil Co. as a petroleum engineer at Oklahoma City. Before coming with Kingwood, he was a petroleum engineer with Stephens & Phillips Drilling Co., at Mount Pleasant, Tex.

Wright Bradley, former development engineer for Richfield Oil Co., has been appointed manager of Great Lakes Oil & Chemical Co.'s producing and drilling department in Wyoming.

Lucien F. Craig, associated with Gulf Oil Corp. for nearly 20 years, has been named the company's Washington representative. During World War II, Craig was an adviser to the Petroleum Administration for War.

Elmer F. Schmidt, senior vice president of Lone Star Gas Co., Dallas, retired from active service with the company June 1 and will open a consulting office in Dallas. Schmidt joined Lone Star in 1918 as gas-measurement superintendent. He was named chief engineer in 1920, general superintendent in 1925, and vice president in charge of production and transmission in 1935. He also was a member of the board of directors.

Edward A. Koester and **Lee H. Cornell,** consulting petroleum geologists at Wichita, have formed a new partnership with headquarters there. Koester is president of the American Association of Petroleum Geologists. Cornell has been an independent for 2 years after serving previously with Franco-Central Oil Co. and Stanolind Oil & Gas Co.

R. J. Schreiner has joined Time Petroleum Co., Wichita, Kans., as geologist-manager of the exploration and development department.

D. E. Quail, Shell Oil Co. of Canada, Ltd., has been moved from field engineer in the Vancouver district to the position of engineer of the head office engineering department.

R. J. McGreevy has been appointed field superintendent for General Petroleums of Canada, Ltd. He was first employed by General Petroleums as a driller in July 1947 and was promoted to toolpusher in November 1950.

Miller W. Quarles, chief geophysicist of Precision Exploration Co., Houston, has left for Israel where he will serve as a seismic adviser to the United Nations Technical Assistance Administration for the next 2 months.

Jack Cox, who joined Southern Minerals Corp., Corpus Christi, Tex., early in 1953, has been named assistant to the president of the company.

H. E. Rowe, Jr., has been appointed drilling superintendent of Cimarron Drilling Co., and Cimarron Western Drilling Co., Tulsa. Both are subsidiaries of Beach & Talbot and operate principally in southern Oklahoma, the Texas Panhandle, and the Rocky Mountains.

Harry A. Miller, Jr., has resigned as district geologist for Hancock Oil Co. at Midland, Tex., to set up an office as a consulting geologist there. Miller had been with Hancock 2½ years and before that worked with Ohio Oil Co. in Midland as a staff geologist.

Rollin Eckis, chief geologist for Richfield Oil Corp. for the last 8 years, has been appointed manager of exploration succeeding **Frank A. Morgan,** who has resigned. Eckis has been associated with Richfield since the company formed its exploration company in 1937. He began as district geologist, northern division, with his headquarters at Bakersfield, Calif. In 1946 he was appointed chief geologist.

DEATHS

Mrs. Maud Adams Mosier, 89, principal stockholder in Petroleum Co. of Los Angeles, died in Los Angeles May 27. She was the widow of Martin Henry Mosier, pioneer oil developer who had holdings in the Southland and other areas of the United States until his death in 1939.

Sherman N. Shumway, 59, vice president and director of Signal Oil & Gas Co., died recently at Soboba Hot Springs, Calif.

William A. (Bill) Aggas, owner of Aggas Drilling Co., died May 28 in an Okmulgee, Okla., hospital. He had participated in extensive drilling operations in Oklahoma since 1912.

Willis G. Green, 39, senior chemical engineer for General Petroleum Corp., died recently at Alhambra, Calif.

Jordon Ernest Thompson, 44 engineer with Sun Oil Co., was killed May 28 in an automobile wreck near Beaumont, Tex.

W. W. Fleming, 69, retired vice president and director of Ohio Oil Co., died May 28 at his home in Tulsa. Fleming served 36 years with Ohio and was credited with discovering Yates pool in West Texas.

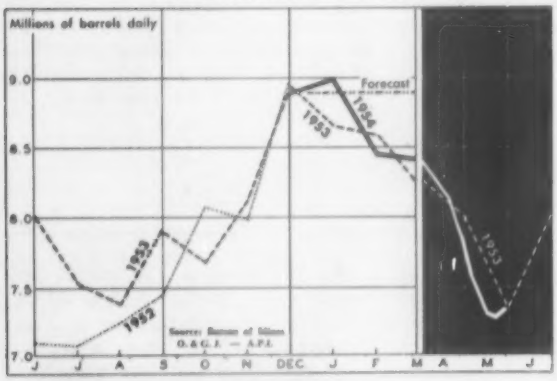
Harry Hines, 67, Dallas independent oil operator, died May 28 in Dallas. Hines entered the oil business in 1916 as a drilling contractor and crude producer in Oklahoma. He drilled and completed his first wells in the Nowata, Bartlesville, and Cement fields in that state. He entered North Texas just prior to the Sunshine Hill and Burkburnett discoveries, and his interests later spread through Louisiana, Arkansas, and Mississippi, in addition to Texas and Oklahoma. Some of his earlier business associations were as a partner in Knight & Hines and Consolidated Oil Co. with Col. W. T. Knight in Wichita Falls, and as vice president and general manager of Deep Oil Development Co., a million-dollar concern formed by the city of Wichita Falls.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,436,600	DOWN	12,850	UP	41,700
Crude stocks	275,909,000	UP	1,985,000	DOWN	2,381,000
Completion	992	DOWN	80	UP	51
Refinery runs	7,020,000	UP	51,000	DOWN	27,000
Gasoline stocks	172,855,000	DOWN	1,697,000	UP	22,045,000
Four-product stocks	313,928,000	UP	3,018,000	UP	28,195,000
Total imports	1,156,500	UP	54,400	UP	126,200

TOTAL DEMAND—ALL OILS



Gasoline Demand Will Be Up in June But Less Than Last Year's Record

MANY suppliers take a closer-than-normal look at gasoline sales figures for the last week in May and the first week in June. Memorial Day for many years has been considered the opening of the motoring season, and in past years the gasoline sales records just before and after the holiday have been considered indicators of demand for the summer.

The traditional look at gasoline statistics for the Memorial holiday dates back to the time when there was a sharp break between winter and summer demands for gasoline. The difference between summer and winter demands for gasoline has been reduced in recent years, but the end of May is still near the opening of the vacation season and a period of increased demand for gasoline.

Motor fuel off . . . Gasoline demand for the early months of the year was disappointing. Domestic demand for the first 3 months of the year averaged 3,085,000 bbl. daily for a gain of only 2.9 per cent over the first quarter of 1953. Gasoline exports for the quarter were less than a year earlier, resulting in a net gain in total gasoline demand of only 2.1 per cent. The decrease in exports was expected, but most industry forecasts called for a gain of about 4.5 per cent in domestic demand in the first quarter on the old basis in which jet-fuel components were included in the demand figures for gasoline, kerosine, and distillate.

Influence of jet fuel . . . Domestic demand for jet fuel in the first quarter of this year averaged 111,000 bbl. daily compared with 73,000 bbl. daily for the first 3 months of last year. Since about 70 per cent of jet fuel would have been credited to gasoline under the old method of reporting, 27,000 bbl. of the 38,000 bbl. daily increase for jet fuel was lost as a gasoline increase.

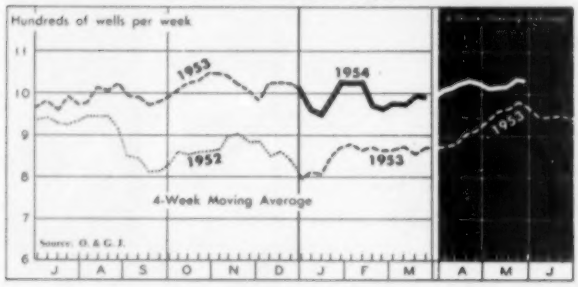
On a basis of about 3,000,000 bbl. daily gasoline demand for the first quarter, the transfer of an increase of 27,000 bbl. daily from gasoline to jet fuel represented a difference of about 0.9 per cent in the gasoline increase over last year. If the gasoline component of jet fuel had been credited to gasoline for the first quarter, domestic gasoline demand would have been up about 3.8 per cent over the same quarter of 1953.

June vs. June . . . Total demand for gasoline in June last year, excluding jet-fuel components, averaged 3,838,000 bbl. daily or 148,000 bbl. daily more than the closest month. Peak demand normally comes in July or August.

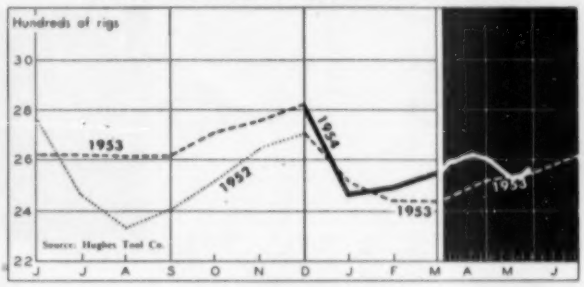
Part of the big increase for June last year was due to advance buying in the last half of the month. Crude prices went up at the middle of June. Jobbers and consumers filled secondary storage before product prices increased at the end of the month.

Considering the abnormal movement out of primary storage last June, demand this June will be satisfactory if it reaches last year's level. Percentage gains should return in July and August.

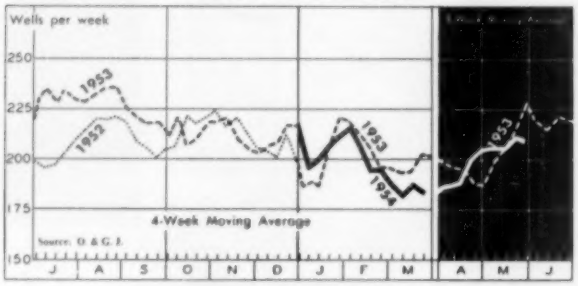
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

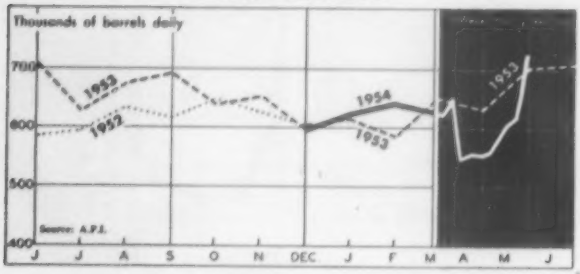
Area—	5-31-54	Change from 5-24-54	Change from 6-1-53
Gulf Coast	581	24	—26
N. and W. Texas-New Mexico	789	10	— 1
Arkansas-N. Louisiana-E. Texas	170	— 7	49
Oklahoma	333		— 8
Kansas-S. Nebraska	147	— 1	—31
Illinois-Eastern	145	9	6
Rocky Mountain	263	4	22
Pacific Coast	143	3	—25
Total United States	2,571	42	—14
Western Canada	121	10	—17

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 29, 1954

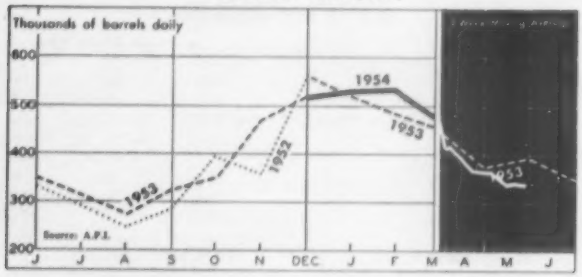
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	3	0	0	3	16,239	45	55	0	0	0	3	3	2	0	1	38	41
Arkansas	10	5	2	3	40,977	270	190	1	0	1	1	3	13	0	4	41	58
California	36	23	1	12	150,080	1,023	1,073	0	0	0	9	9	32	1	6	212	251
Colorado	27	10	4	13	145,039	526	208	2	0	0	10	12	16	0	0	190	206
Illinois	50	22	0	28	110,113	1,104	686	1	0	0	8	9	4	0	0	174	178
Indiana	19	6	0	13	32,123	327	488	0	0	0	6	6	4	0	0	75	79
Kansas	94	53	9	32	326,825	1,849	2,049	4	0	1	9	14	34	0	8	237	279
Kentucky	21	8	6	7	47,125	448	423	0	0	0	4	4	8	0	0	49	57
Louisiana	72	56	5	11	429,165	1,362	1,052	4	5	0	3	12	46	25	14	112	197
North	43	37	3	3	117,190	733	426	0	2	0	1	3	5	2	5	42	54
South	29	19	2	8	311,975	629	626	4	3	0	2	9	41	23	9	70	143
Michigan	16	7	0	9	38,411	233	219	0	0	0	6	6	7	0	0	97	104
Mississippi	8	3	0	5	63,452	156	144	0	0	0	4	4	3	0	0	56	59
Montana	2	1	0	1	4,869	111	158	0	0	0	1	1	1	0	0	31	32
Nebraska	4	2	0	2	21,221	136	123	0	0	0	2	2	9	0	1	45	55
New Mexico	11	8	2	1	67,846	432	561	0	0	0	1	1	8	0	5	54	67
North Dakota	4	4	0	0	34,474	96	106	0	0	0	0	0	3	0	0	30	33
Ohio	22	14	5	3	47,608	456	414	1	0	1	0	2	2	0	3	5	10
Oklahoma	196	125	9	*62	605,110	3,840	2,924	6	0	2	7	15	52	2	11	253	318
Pennsylvania-New York	57	24	11	†22	107,282	1,008	959	0	0	0	1	1	0	0	4	15	19
Texas	305	181	12	112	1,415,521	7,418	7,079	22	1	1	57	81	301	34	62	1,698	2,095
Southwest (1 & 4)	44	27	2	15	193,819	1,053	1,148	13	0	0	4	17	43	18	15	287	363
Gulf Coast (2 & 3)	48	26	3	19	283,466	1,101	1,050	1	1	1	8	11	32	11	18	267	328
East (5 & 6)	16	6	3	7	88,583	375	339	0	0	0	5	5	8	0	6	104	118
North Central (7-B & 9)	109	61	2	46	348,014	2,802	2,609	3	0	0	19	22	132	4	8	703	847
West (7-C & 8)	73	52	0	21	447,858	1,703	1,586	5	0	0	17	22	86	0	10	301	397
Panhandle (10)	15	9	2	4	53,781	384	347	0	0	0	4	4	0	1	5	36	42
Utah	5	0	3	2	27,337	27	31	0	0	1	1	2	2	0	1	14	17
West Virginia	13	1	12	0	33,642	220	233	0	0	2	0	2	0	0	12	7	19
Wyoming	17	14	0	3	91,187	582	246	1	0	0	3	4	22	0	3	77	102
Miscellaneous	0	0	0	0	0	76	22	0	0	0	0	0	1	0	0	10	11
Total United States	**992**	567	81	344	3,855,646	21,745	19,443	42	6	9	136	**193**	570	62	135	3,520	4,287
Total previous week	1,072	632	51	389	4,430,620			33	5	5	192	235	528	56	126	3,384	4,094
Total May 30, 1953	941	493	78	370	3,846,004			30	4	10	192	236	578	40	160	3,591	4,369

Service wells included: *2, †18.

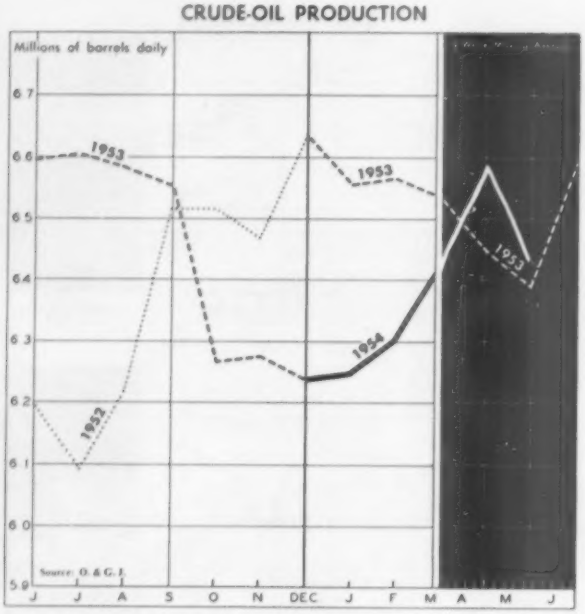
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

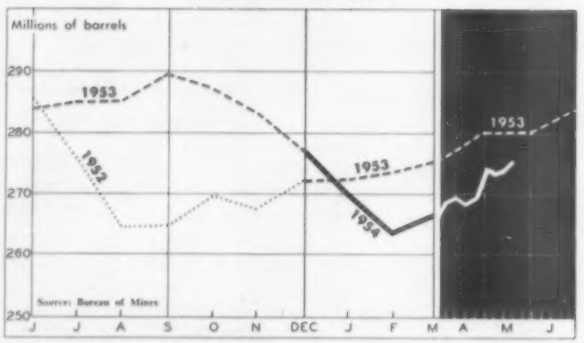


DAILY AVERAGE PRODUCTION FOR WEEK

	May 29 Crude oil	May 29 Lease condensate	May 29 Total	May 22 total
Alabama	4,400		4,400	4,500
Arkansas	77,050	550	77,600	77,800
California	990,200		990,200	990,200
Colorado	125,800		125,800	128,100
Eastern	54,500		54,500	54,500
Florida	1,650		1,650	1,650
Illinois	185,400		185,400	181,200
Indiana	30,400		30,400	31,000
Kansas	329,200		329,200	339,000
Kentucky	37,600		37,600	37,100
Louisiana	668,800	44,100	712,900	713,350
North	108,800	3,600	112,400	112,850
South	560,000	40,500	600,500	600,500
Michigan	37,300		37,300	36,600
Mississippi	89,300	3,200	92,500	92,100
Montana	34,800		34,800	36,900
Nebraska	20,300		20,300	20,400
New Mexico	204,100	1,600	205,700	205,900
North Dakota	15,100		15,100	15,000
Oklahoma	539,500		539,500	542,200
Texas	2,640,000	50,550	2,690,550	2,690,550
Dist. 1	41,500	425	41,925	41,925
Dist. 2	139,000	7,200	146,200	146,200
Dist. 3	416,000	24,250	440,250	440,250
Dist. 4	240,000	6,000	246,000	246,000
Dist. 5	44,000	450	44,450	44,450
Dist. 6	109,000	5,200	114,200	114,200
East Texas field	229,500		229,500	229,500
Dist. 7-B	119,000	50	119,050	119,050
Dist. 7-C	178,000	4,750	182,750	182,750
Dist. 8	856,000	1,700	857,700	857,700
Dist. 9	188,000	500	188,500	188,500
Dist. 10	80,000	25	80,025	80,025
Utah	5,700		5,700	5,500
Wyoming	245,500		245,500	245,900
Total U. S.	6,336,600	100,000	**6,436,600**	6,449,450
Change from previous week,			down **12,850**	
Canada	255,825		255,825	237,825
Total U. S. production January 1-May 29				957,568,350 bbl.
Same period last year (crude plus cond.)				*968,006,840 bbl.

*Includes 13,943,400 bbl. condensate.

CRUDE-OIL STOCKS



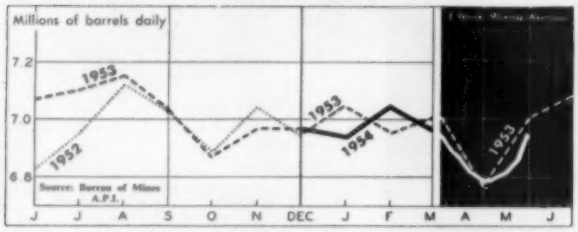
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

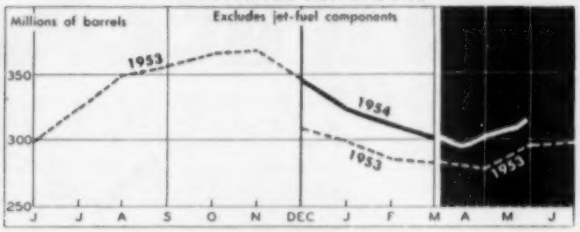
	May 22, '54	May 15, '54	May 23, '53
Pennsylvania Grade	3,279	3,194	2,509
Other Appalachian	1,938	1,876	2,100
Illinois, Indiana, Michigan	12,412	11,598	11,974
Kansas	10,022	9,761	10,004
Oklahoma	27,412	27,457	28,626
Arkansas	3,233	3,380	2,917
Louisiana	16,196	16,584	16,407
North	2,505	2,535	2,833
Gulf	13,691	14,049	13,574
Mississippi	3,284	3,420	4,044
New Mexico	6,868	7,163	7,090
Texas	128,616	126,969	132,324
East Texas proper	11,973	11,763	11,305
West Texas	55,986	55,608	62,768
Texas Gulf	27,303	27,141	25,496
Other Texas	33,354	32,457	32,755
Wyoming	14,509	14,249	14,440
Other Rocky Mountain	4,126	4,195	3,339
California	32,787	33,456	32,361
Foreign	†11,227	10,622	10,155
Total	275,909	273,924	278,290

*Bureau of Mines. †Includes 2,634,000 bbl. in California.

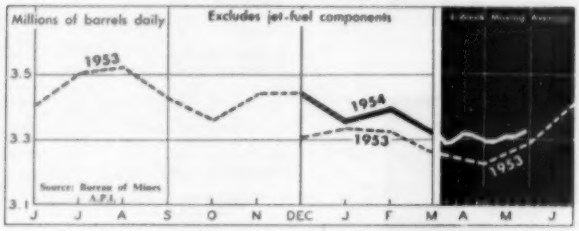
REFINERY RUNS



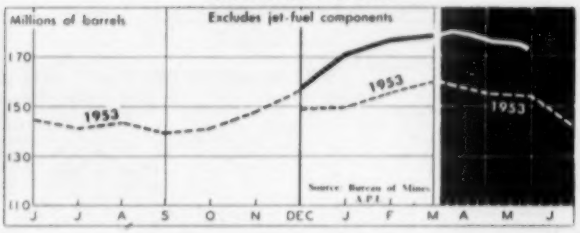
FOUR-PRODUCT STOCKS



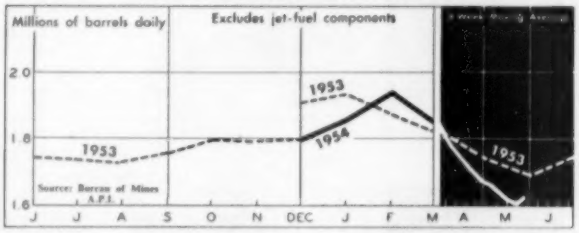
GASOLINE PRODUCTION



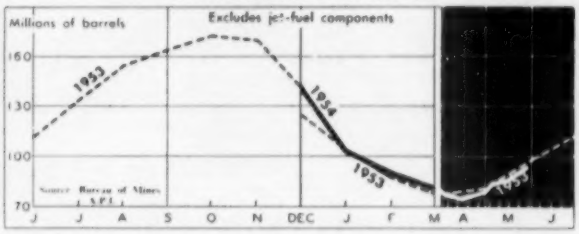
GASOLINE STOCKS



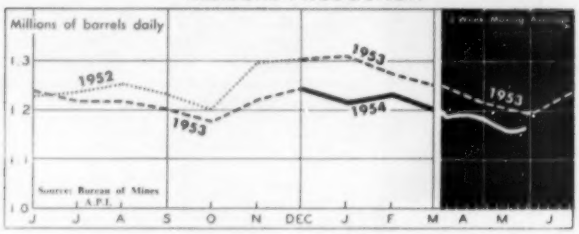
MIDDLE-DISTILLATE PRODUCTION



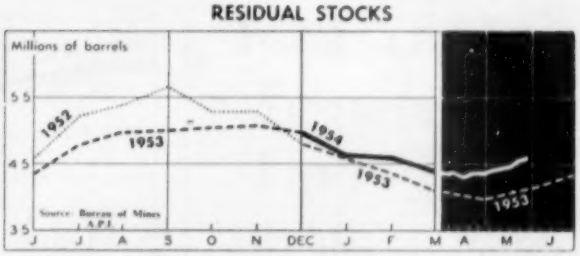
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, MAY 29

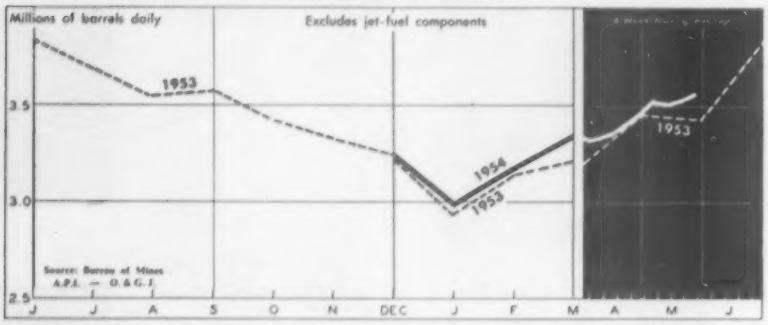
(Excludes all jet-fuel components)

(Thousands of barrels)

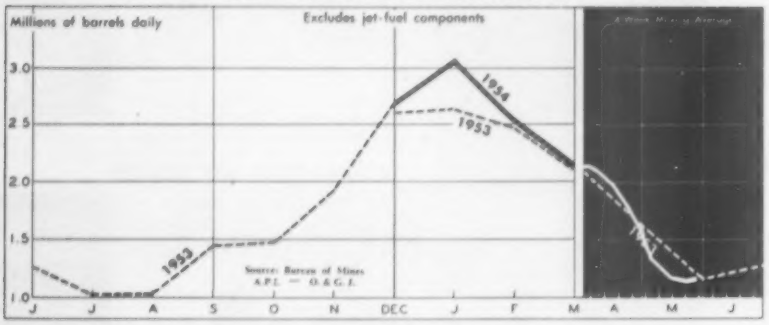
District—	Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.	Stocks‡ — Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, May 1953 — Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.
East Coast	1,069	395.7	32.4	224.4	203.4	36,827	9,508	23,373	9,376	1,039	413.9	35.6	239.5	223.1
Appalachian:														
District 1	105	48.3	3.6	21.7	12.6	4,531	419	1,244	508	103	39.7	4.9	16.2	14.0
District 2	88	48.8	3.0	8.7	11.4	2,766	366	681	352	95	48.2	3.0	11.3	14.3
Ind., Ill., Ky.	1,263	627.8	84.7	232.0	183.7	37,867	4,945	12,382	4,186	1,229	630.6	68.5	199.1	156.1
Okla., Kans., Mo.	629	346.7	15.0	125.4	44.9	17,816	1,296	8,092	1,260	571	309.1	15.4	128.1	48.9
Inland Texas	245	183.3	14.3	45.9	25.4	7,187	371	1,374	1,366	263	169.5	15.4	41.9	34.4
Texas Gulf Coast	1,679	756.9	92.0	333.3	218.4	22,829	3,163	6,916	4,172	1,707	799.3	100.4	390.2	241.3
La. Gulf Coast	597	285.0	61.3	140.0	46.9	8,788	2,018	3,555	1,220	570	270.1	42.2	133.3	52.8
N. La. and Ark.	88	38.9	9.1	20.0	6.7	3,946	685	965	211	86	32.1	7.9	18.5	7.2
Rocky Mountain:														
New Mexico	19	11.3	1.0	3.0	2.9	212		66	44	17	10.9	0.5	2.1	3.4
Other Rocky Mtn.	243	117.6	2.7	52.6	34.3	8,100	187	2,073	891	238	111.8	3.9	52.4	42.3
California	995	434.4	14.6	144.3	394.1	21,986	458	10,503	22,847	1,084	461.6	5.8	154.6	359.6
May 29, 1954	7,020	3,294.7	333.7	1,351.3	1,184.7	172,855	23,416	71,224	46,433	7,002	3,296.8	303.5	1,287.2	1,197.4
May 22, 1954	6,969	3,336.1	290.0	1,307.6	1,180.1	174,552	22,263	68,329	54,766					
May 30, 1953	7,047	3,304.4	335.1	1,397.3	1,223.4	150,810	22,948	70,550	41,425					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

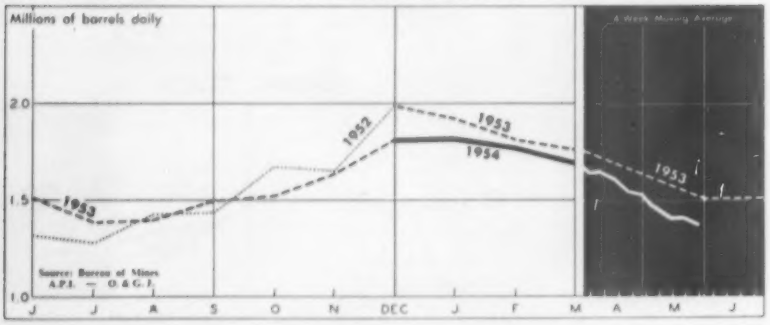
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of June 2, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.75-11	11.5-12.25	10.25-10.5
Premium gasoline	11.75-12	13.25-14	11.5-12.0
42-44 w.w. kerosine	9-9.25	9.95	9
No. 2 straw fuel oil	8.125-8.25	8.95	8
No. 6 residual	$0.95-1.10	$2.20-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Some suppliers in the Mid-Continent report deliveries of gasoline out of pipeline terminals in the last week of May below expected levels. Since holiday traffic was about up to forecast, shipments of gasoline should be up for the first week of June.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 5-29-54	3,326	3,581
March 1954	3,261	3,331
February 1954	3,365	3,182
May 1953	3,297	3,456
Middle distillate:		
Four weeks ended 5-29-54	1,621	1,158
March 1954	1,811	2,241
February 1954	1,957	2,417
May 1953	1,691	1,171
Residual fuel:		
Four weeks ended 5-29-54	1,168	1,385
March 1954	1,169	1,667
February 1954	1,241	1,753
May 1953	1,197	1,510

SUPPLY AND DEMAND*

(Thousands of barrels daily)

	March 1954	March 1953
Domestic demand	8,054	7,804
Gasoline	3,276	3,122
Kerosine	419	380
Distillate	1,749	1,624
Residual	1,577	1,702
Jet fuel	120	69
Lubricants	115	104
L.P.G.	321	319
Other products	447	458
Crude loss	30	26
Exports	284	440
Gasoline	55	97
Kerosine	20	26
Distillate	53	107
Residual	90	76
Jet fuel	1	
Lubricants	34	38
L.P.G.	12	8
Other products	19	18
Crude	28	70
Total demand	8,366	8,244
Gasoline	3,331	3,219
Kerosine	439	406
Distillate	1,802	1,731
Residual	1,667	1,778
Jet fuel	121	69
Lubricants	149	142
L.P.G.	333	327
Other products	466	476
Crude exp. and loss	58	96
Stock change	— 88	52
Crude	160	67
Products	—248	—15
New supply	8,278	8,296
Imports	1,088	1,112
Crude	653	655
Products	435	457
Production	7,190	7,184
Crude	6,507	6,531
Natural gasoline, etc.	683	653
Runs to stills	6,923	7,002

*Bureau of Mines.

(The schedule of selected crude prices appeared on page 456 of May 24 issue and will be printed again next week.)

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250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lundquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

BUCYRES - ERIE 22W spudder, trailer-mounted—49 Chevrolet truck—drilling line—sand line—bits—bailers—wrenches complete. All A-1 condition. Thomas Whelan, 712 West 2nd St., Odessa, Texas.

FOR SALE: Model "K" Cardwell single drum well servicing unit, powered by 6-SRK Waukesha. With single pole telescoping mast, tubing line, 2", 2½" and 3" tubing tools mounted on Ford tandem truck; ½ ton Studebaker service pickup. Good running condition. For details, call or write Melco Drilling Company, Phone 2333, Box 1360, Seminole, Oklahoma.

FOR SALE: Wilson Titan—20" Gardner-Denver pump, 14" Gardner-Denver pump, 300-ton derrick equipment, Cameron Blowout preventer, 10,500' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-202, The Oil and Gas Journal, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

20 CARLOADS
Special Low Price
Reconditioned Black Pipe

With beveled ends ready for installation in gas, water, oil lines or structural purposes.

8⅝" O.D. .322 wall, 28.55 lb. per ft.
12¾" O.D. .375 wall, 49.56 lb. per ft.
20 foot random lengths lapweld.
Complete inventories of all sizes black and galvanized pipe available.

Write—Wire—Phone

SONKEN - GALAMBA CORPORATION
2nd and Riverview (X-158)
Kansas City 18, Kansas
ATwater 9305

FOR SALE EQUIPMENT

MODEL H CARDWELL Servicing Unit. Truck mounted with mast. Fully equipped. Box No. 1 or Phone 153, Canton, Kansas.

FRANKS ETS-500—Single Drum Hoist Less Engine. Sales Price—$1,500. General Appearance—Good. Unit complete with Franks Power Take-Off; Mounted on Steel and Wood Truck Bed. Location of Unit—Winfield, Kansas. Contact Cardwell, Wichita.

FRANKS MODEL 5000 Spudder—Serial No. 806. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 68' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit—Western Kansas. Contact Cardwell, Wichita.

FOR SALE: 12,000' 4" o.d. seamless line pipe, 40' random lengths. Clean inside and out. Beveled ready to lay 35c f.o.b. our yard. M. J. Regan Pipe Co., Coffeyville, Kans.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

SPECIAL LIQUIDATION

TOWERS AND COLUMNS

1—8' O.D. x 61' 6" SS, 15 trays 50#, 300° F.
1—7' 6" O.D. x 55' 6" steel, 30 trays 45#, 300° F.
1—7' I.D. x 42' steel, 20 trays 40#, 150° F.
1—7' I.D. x 25' 6" SS, 10 trays, 50#, 250° F.
1—6' I.D. x 64' steel, 35 trays, 55#, 300° F.
1—6' I.D. x 45' SS, 15 trays, 850#, 350° F.
1—5' O.D. x 61' 6" steel, 15 trays, 55#, 300° F.
1—4' O.D. x 72' SS, 40 trays, 75#, 300° F.
1—3' 6" I.D. x 63' steel, 35 trays, 55#, 250° F.
1—2' 6" I.D. x 60' steel, 35 trays, 55#, 300° F.
1—2' O.D. x 75' steel, 45 trays, 55#, 300° F.
1—2' I.D. x 39' SS, 40 trays, 70#, 300° F.

HEAT EXCHANGERS-CONDENSERS

2—1440 sq. ft. 304 S.S. 75# PSIG, 350° F.
3—1345 sq. ft. steel, 70# PSIG, 300° F.
2—1250 sq. ft. steel, 45# PSIG, 350° F.
2—1125 sq. ft. steel, 850# PSIG, 900° F.
2—1125 sq. ft. 304 S.S., 55# PSIG, 450° F.
1—750 sq. ft. steel, 60# PSIG, 350° F.
1—660 sq. ft. steel, 55# PSIG, 350° F.
1—600 sq. ft. 304 S.S., 75# PSIG, 350° F.
1—140 sq. ft. steel, 55# PSIG, 185° F.

OTHER ITEMS

Complete oxygen plant, 170 T/Day, 95% pure oxygen.
Two Clark gas engine—800 BHP, Rt. Angle Comp.
Two Clark gas engines—150 BHP, Rt. Angle Comp.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, Justin 6032

FOR SALE EQUIPMENT

FOR SALE: New Wilson Giant—127' Mast, 18" Oil Well pump, Cameron Blowout preventer, 9,000' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-203, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1951 Cessna 195: 245 HP; 400 total hours; Cross-wind Gear; VHF; OMNI; Gyros; Hangered; Brand new condition; one owner; $6,500; write Box H-201, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR RENT, sale or rental purchase: 1 TD18A, Serial 23635 equipped with PBI-18 Pipeboom; 1 LS51 Speeder backhoe and dragline, Serial 6G152; 1 25 bbl. CRC paint kettle with agitator on Athey tracks. Knupp Construction Co., Box 152, Great Bend, Kansas, Phone 3528.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C.; 2 unused, 1 slightly used. 11—Sperry 18" x 18" cast iron Filter Presses, 11 chambers. Consolidated Products Co. Inc., #65 Garden Street, Hoboken, N. J. N.Y. Tel.: BArclay 7-0600.

FOR SALE
Seamless
Line Pipe

6,500 Feet—8⅝ O.D. 28.55#

1,400 Feet—10¾ O.D. 40.48#

Above items Grade A seamless, cleaned, straight, beveled; Approx. 40' DRL, excellent, like new condition. Priced low. Immediate shipment, Wilmington, Illinois.

Write, Wire, Phone

Humboldt-Chicago
PIPELINE PROJECT
125 W. 3rd St., Tulsa, Oklahoma
Phone—3-5400

FOR SALE EQUIPMENT

FOR SALE: FRANKS ROTARY—35 draw works powered 471 G.M.C. Diesel. Mounted tandem portable trailer, Gardner-Denver mud pump 7 x 10 with D-1300 Caterpillar Power. 3000 Ft. of 3½ inch drill pipe with new tool joints. Have drilled 3100 ft. deep. 2 doghouses, 2 trucks, water tank, light plant, drill collars, overshot, core barrel, 56 ft. mast. Ready to drill. Cash Price $26,000.00. Lloyd K. Jones, Phone 680, Box 128, Emporia, Kansas.

FAILING MODEL 1500 heavy duty drill. Write P. O. Box 819, Longmont, Colorado, for details.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE: 63 Semi-trailer all steel Speedstar spudder, also Model H Fort Worth. Star Drilling Supply Co., Chanute, Kans.

SEISMIC EQUIPMENT:
Two Mayhew 1000 Heavy duty drill, 5 x 6 pumps; mounted on GMC Trucks, with two water Tank Trucks mounted on GMC Trucks, like new. S. I. E. 24-trace recorder with jugs; shooter's truck; reel truck; two surveyors pickup trucks; station wagon; two alidades; dynamite trailer—all in excellent condition. Never used on contract jobs. Going out of seismic business. Will sell for half invoice prices. Phone 2-1783 McCarty & Coleman, 506 First National Bank Building, Wichita Falls, Texas.

3065'—9" O.D. 40# used J-55 S.S. Casing No. 1, per ft. $2.25. Oklahoma Pipe & Supply, Box 4671, Tel.: M.E. 7-4444, Oklahoma City, Okla.

4—55,000 BARREL Tanks, 2 fabricated for immediate erection. S. S. Staley, Jr., Box 5885, Phone EMerson 6947, Dallas, Texas.

2—MOGUL Wilson draw works casing pulling rigs complete with Thrift pump, mud pump and tools. 1—Super Wilson draw works rig with same as above. 1—Stripped down Wilson Super draw works with motor only. Very cheap. 1—1946, 7½ ton White Truck. 2—GMC ¾ Ton Pickups. 1—1 ton Intl. Pickup. 1—8¾" Landis Pipe Machine. 1—McFarland Pipe Tester. 1—Large assortment Fishing Tools. 3—Steel Warehouse Buildings and Office. 7—Large City Lots. 1—50' Fairbanks-Morse Scales. To inspect contact Joe B. Skeen at Acme Pipe & Supply Co., Overton, Texas. Box 1063. Tel. 4621

FOR SALE at Reduced Prices: 3 Happy Coolers for 25, 30, and 50 H.P. engines. Joe A. Huitt. Deep Rock Oil Corporation, Tulsa

DRILLING equipment. New and used spudders, rotaries, tools. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

COMPLETE Rotary Rig Unit U15, powered by two 222 hp. Murphy Diesel, 7¼ x 14 Oilwell Pump, 3500' Drill Pipe, 95' Lee C. Moore Mast and Tools. Located Mt. Vernon, Indiana, $60,000. Write or Phone, Paul Rossi, 314 Court Bldg., Evansville, Indiana.

SELAS HEATER

10—15 Million B.T.U., Type F 2.
24—1¼" O.D. x 20'—4-6% Chrome Tubes w/Unibolt Return Bends, Tube Sheets. Will carry 4" O.D. Tubes if larger Tubes required. 42—Selas Burners—3 Tiers of Seven each on either side. Complete w/mixer and Blower for Air Fuel premixing. Stack—3' x 27' High lined w/insulating Cement. Present rating 10 Million B.T.U. w/addition of convection bank will increase to 15 Million B.T.U. Available for immediate delivery—Houston, Texas.

Guaranteed First-Class Condition
Prints Available—Inspection Invited

WIRE—WRITE—PHONE

REFINERY & GASOLINE PLANT EQUIPMENT, INC.
2918 West Gray
Telephone: Lynchburg 3806
P.O. Box 13203 Telefax: TGQ
Houston 19, Texas

FOR SALE EQUIPMENT

WILSON TITAN, San Juan Basin, 2-LRO Waukesha, 131' Emsco Mast, 10' Sub-structure, 7¾ x 16 Pump, 6000' 4½" D.P., 10 Drill Collars, Blowout Preventer, see on job. P. O. Box 1826, Wichita Falls, Texas.

TWO GARDNER-DENVER Slush Pumps, 5" x 8". Priced to sell. Located at Independence, Kansas, contact Mountain Iron and Supply, L-D 229, Wichita, Kansas.

WILSON GIANT, San Juan Basin, with 2-V12 Le Roi, 131' L. C. Moore, Sub-structure, Blowout Preventer, 7¼ x 14 Pump, 5000' 4½" D.P., 10 Drill Collars, complete ready to run. P. O. Box 1826, Wichita Falls, Texas.

WILSON SUPER, San Juan Basin, 87' Mast Pole, Substructure, 3000' 4½" D.P., 6 Drill Collars, 7¼ x 12 Pump, complete rig. P. O. Box 1826, Wichita Falls, Texas.

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg-McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others—Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED: 30,000 pound package type boiler, 150 psig. N. W. Refining Co., St. Paul Park, Minnesota.

WANTED: 250 sets 2⅞" Reg. Tool Jts. for interval upset pipe. Penick Supply, Pho. 1229, Monahans, Tex.

WANTED TO PURCHASE: Steam driven forged steel water cooled simplex pump approximately 8 x 5 x 12. Also motor driven steam-jacketed asphalt pumps. Send specifications and price to Box 185, Cordova, Alabama.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

MATERIAL WANTED

One 13⅝" Shaffer Blowout Preventer, Type 39. One 10¾" Shaffer Blowout Preventer, Type 39.

MAKIN DRILLING COMPANY
P.O. Box 1628
Hobbs, New Mexico

HELP WANTED

CO_2 CONSULTANT

Separation-Purification-Manufacture of Dry Ice from well gases. Design, construction, operation, trouble shooting.

Box H-230
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

REFINERY ENGINEER
Upper Midwest refinery has excellent opportunity for young man. Must have several years' experience in refinery operations or engineering and have degree in chemical or mechanical engineering. Write Box H-206, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM OR RESERVOIR ENGINEER

With minimum 3 years experience in development, production and oil and gas reservoir engineering on primary and secondary recovery problems. For New York office of major foreign producer.

MICROPALEONTOLOGIST

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in New York research laboratory. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned.

Salary for above positions dependent on experience and qualifications. Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OGJ-11

Arabian American Oil Company

505 Park Avenue
New York 22, N. Y.

GEOLOGISTS

Major company beginning exploration program in Egypt is accepting applications for the following geological positions:

Research Geologist—regional and local stratigraphic studies; knowledge of micropaleontology; 4 or more years of experience, preferably including foreign.

Photogeologist—experienced in geological interpretation of air photos.

Surface Geologists (3)—2 or more years of experience in surface mapping.

Junior Geologists (3)—for surface mapping; little or no experience necessary.

Seismograph Geologists (2)—some experience in subsurface and geophysical operations.

Reply, stating qualifications and experence, to:

Box H-216
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

PETROLEUM ENGINEERS: Major oil company in South America has varied positions for single graduate engineers. Must have minimum one year each production and engineering experience. Reply giving full details—age, experience, college, military status, etc. Box H-228, The Oil and Gas Journal, Tulsa, Oklahoma.

OPERATOR wanted to drill Tennessee acreage over Oil-Gas seepage territory. Valuable gas market adjacent. E. A. Munyan, 102 Fairview Drive, Fairfax, Va.

REFINERY OPERATING SUPERVISOR
Modern Midwest refinery undergoing extensive refinery expansion, desires man to assist in supervising fluid cat-cracking polymerization and topping operations. Must have at least five years' experience and college degree. Box H-208, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY PROCESS ENGINEER
Excellent future in Midwest refinery. Age 25-35 with BS degree in chemical or petroleum engineering. Must be thoroughly familiar with modern refinery processes. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

MAJOR OIL COMPANY with Southern Oklahoma Refinery has an opening for a Senior Engineer well experienced in technical service work, with major emphasis on fluid catalytic cracking. Duties will consist of technical advisory work to operating supervision and making economic studies on various operating units. Applicant must be a college graduate in refining or chemical engineering. Give experience and salary required. Box H-231, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

GRADUATE Petroleum Engineer with minimum of four years experience in reservoir studies, calculations and expected life of reserves, and computation of economics by major oil company headquarters Tulsa. State experience and qualifications Box 521, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

THE SUPERIOR OIL COMPANY has an opening in the Geophysical Department, starting as a computer. College degree in Geology, Geological or Petroleum Engineering required plus math through calculus and basic physics. No experience required. Send transcript, photo and letter of application to Personnel Department, The Superior Oil Company, Midland, Texas.

PROCESS ENGINEER
Excellent opportunity in Midwest for young man 25 to 45 with B.S. or equivalent in chemical engineering. General experience in distillation, light ends separations and absorber design desirable. Would participate in new tray design and development. Box H-225, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

OVERSEAS OPPORTUNITIES

Affiliates of
STANDARD OIL COMPANY (NEW JERSEY)
located in South America
NEED . . .
OIL REFINERY ENGINEERS

CHEMICAL ENGINEERS
Assignments will include economic studies and preparation of refinery operating programs. Experience using statistical methods desirable.

ELECTRICAL ENGINEERS
Graduate engineers with several years electrical design experience required. Will design electrical installations, including transmission, distribution, control, lighting, and communications systems.

MECHANICAL ENGINEERS
Work assignments will include piping, pressure vessel, pumping, and heat exchange equipment design. Knowledge of cost estimating, material specifications and quantity take off required.

INSPECTION ENGINEERS
Engineering degree and several years oil refinery metals inspection experience. Will inspect oil refinery equipment and request equipment renewals where corrosion, failure, or defectiveness under safety codes makes necessary.

These are regular staff positions offering liberal salaries and benefit plans.

WRITE

giving complete address, age, marital status, education, and details of previous experience. Box 308-T, Radio City Station, New York 19, N. Y.

SITUATIONS WANTED

CHIEF PETROLEUM ENGINEER: Major company, South America. Production geology and petroleum engineering background, B.S., 37. Have handled important technical and administrative duties for many years. Want job with sound, efficiently managed company, U.S.A. or Canada. Box H-209, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING-PRODUCTION-COMPLETION SUPERINTENDENT, 7½ years' major company experience. Engineering background. Currently employed as Production Superintendent by independent producer desires to make a change. Age 37, married. Box H-223, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING for Company having polite directors loving their employees. To work WITH them. Am Chemist, qualified; 5½ years experience operating Plants. Laboratory organization. Box H-229, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT—30 to 45, degree in chemical or mechanical engineering or physical chemistry. Minimum of five years refinery experience in major supervisory capacity. Experience handling asphalt and/or middle of the barrel petroleum products. Excellent ability for handling personnel essential. West Coast Operation. Box H-227, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 30 years experience, desires position with small company; preferably Oklahoma. Box H-234, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ACCOUNTANT desires position with independent operator. Experienced in office management, taxes, insurance, finance. Can take full responsibility of office and assume administrative duties. Replies strictly confidential. Box H-215, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER: 6 years' experience in maintenance, design, and construction of Fluid and Thermofor Cat Crackers and Auxiliaries. Desire contact with refiner or contractor. Box H-218, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE Geologist in Tulsa, 30, married, 4 years subsurface and surface experience with major and independent, desires permanent position with aggressive independent or consultant. Box H-224, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

YOUNG MAN, Holland-American background, with widespread contacts, and whose experience as landman, oil company executive and independent particularly fits him to new or expanding operations, seeks association with enterprising individual or company. Can offer unusual talents for unusual job.
Box H-233, The Oil and Gas Journal, Tulsa, Oklahoma

BUSINESS OPPORTUNITIES

MANUFACTURER'S AGENT to represent manufacturer of oil field drilling equipment in the West Texas area. Box H-232, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Well established Pipe Service Co. All equipment in excellent condition. Gross $80,000 1953. Several major company contracts, franchise on part of service, specializing pressure testing, cleaning, threading, etc. Low overhead, best location in Mid-Continent Area. Box H-222. The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

OIL ROYALTY
In Colorado's Hot Spot, Weld County; will sell up to 100 Ac. Personally owned minerals under Major Co.'s lease. Perpetual Particp. Also an attractive lease in their block. Guy J. Stumpff, Pet. Eng., Box 278, Aurora Br., Denver, Colo.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

3000 ACRES, Northfield-Macedonia-Twinsburk townships, Summit County, Ohio. Want Trenton test, 4600'. Excellent geology. Small override. W. J. Smith, 3559 East Blvd., Cleveland 5, Ohio. Phone: Michigan 1-1736.

WANTED by responsible independent oil company small depleted reservoir for secondary recovery studies. Require structural closure and gas expansion drive. Prefer shallow, clean sand; small ownership division. Box H-217, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: MONTANA MINERAL INTERESTS: Lower price range, well located. Good return from lease rentals. To Texas Residents only. N. R. Brasted, 816 Sinclair Building, Fort Worth, Texas.

FOR SALE: One of the finest oil leases in Oklahoma. 150 acres with 9 good producing wells. Four drilled less than a year. Five last 90 days. We have not drilled a dry hole on this lease and there are locations for 10 more wells. This lease has 50 to 75 ft. of good Bartlesville sand at less than 1,200 ft. Equipment on lease is all new including a 7-tank battery located on Stanolind pipeline. R.E.A. with all wells on electric motors & time clocks. Contact C. H. Blosser, Phone 15, Concordia, Kansas.

CHEAP VENTURE—200 Acres and Drilling Well. Lower Dutcher. 1 mi. South originally thousand barrel well. ½ mi. North originally 320 bbl. well. 1/32, $175; 1/16, $325; ¼, $625; ½, $1,200. L. Price, Coweta, Okla.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

WYOMING & NEW MEXICO

Physical evidence of production plus competent structure in Wyoming & New Mexico indicate great potential oil discoveries. Complete data to investors re-wells to be drilled, on request.

W. J. PETERMAN, GEOLOGIST
1918-1954

Portales **New Mexico**

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LOOKING NORTHWARD FOR BETTER OPPORTUNITIES?

Alberta offers larger blocks, better deals, exciting new producing horizons, new markets. Leases, reservations (20,000 to 100,000 acres), drilling deals and farmouts arranged by one of Alberta's most successful operators. Interested only in corresponding with substantial interests who are interested enough to inspect deals on the spot in Calgary.

Box H-205, The Oil and Gas Journal,
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

OFFSET farmout, lease, drilling blocks available in several counties, shallow to deep production, also sulphur prospect. Particulars H. Priesmeyer, Garwood, Tex.

FOR SALE: 26 producing wells located in Salt Flats Field, Luling, Texas. Total production approximately 3000 barrels per month can be increased by close supervision. Five houses, supplies and equipment. Plenty of acreage to drill additional wells. A real bargain and a good opportunity to get into the oil business. Priced to sell at $225,000.00. Riddle Oil Co., 59 East Van Buren, Chicago 5, Illinois.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P.O. Box 487, Wilmington, Delaware

MONEY RAISING

YOUR FINANCING PROBLEM can most probably be solved. Inquiries invited. Box H-220, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

FOR SALE: A lovely Colorado Mountain Home, one hour's ride from Denver, in beautiful Idaho Springs. Colonial style and two-car garage. Write for further information to K. T. Johnston, P. O. Box 278, Idaho Springs, Colo.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

EQUIPMENT MEN

Oilwell Names Two to New Sales Positions

SHAUGHNESS

S. E. SNOW

Promotion of Thomas B. Shaughness, assistant manager of the Central Midwest area, to manager of drilling equipment sales for U. S. Steel's Oil Well Supply Division, has been announced by G. A. Hays, the division's director of product sales. S. E. Snow, assistant manager of drilling equipment sales for Oilwell at Dallas, has been named manager of the West Texas district at Midland, Tex., according to William Miskimins, Central Midwest area manager.

In his new post, Shaughness, who has been in charge of Oilwell's West Texas district at Midland, Tex., will have headquarters at the Dallas home offices.

Shaughness joined Oilwell in 1934, and has specialized in manufacture and application of drilling and production equipment, and in sales promotion. He held various engineering and sales engineering capacities at Oil City, Pa.; Dallas; Olney, Ill.; and Harvey, La., prior to March 1946 when he was named area engineer at Houston, the position he held until he became assistant area manager at Midland in 1952.

Snow joined Oilwell in 1926 as a storeman at Best, Tex. He has had a wide acquaintance in the West Texas and New Mexico oil fields where he formerly represented Oilwell and later was associated with Carper Drilling Co. and Bosworth Drilling Co. He rejoined Oilwell in 1953 in the position he leaves to assume his new duties.

Republic Supply Elects Amsden Vice President

M. N. Amsden, general manager of sales for Republic Supply Co., was elected a vice president of this organization at a recent meeting of the board of directors.

Amsden has been with Republic Supply for over 25 years. During this time he has worked in North Texas, South Texas, Louisiana, and in Houston. A year ago, Amsden moved to Oklahoma City from Wichita Falls, Tex., where he had been district manager of the North Texas district for the company.

McCullough Makes Kernahan District Sales Engineer

G. M. KERNAHAN

G. M. Kernahan has been appointed district sales engineer in the Calgary, Alta., area for McCullough Tool Co., according to I. J. McCullough, president. This appointment was necessitated by the increased activities in the Calgary area. For the past several years, Kernahan has been working out of McCullough's Canadian division headquarters at Edmonton, as a sales engineer. Prior to joining McCullough he worked as a sales engineer at Schlumberger Well Surveying Corp.

LEGAL

Sealed bids for the lease of six tracts of tribal land and one tract of allotted land of the Agua Caliente Indian Reservation in Riverside County, California for oil and gas will be opened at 10:00 A.M. on June 28, 1954 at the Palm Springs Sub-Agency, Sacramento Area Office, Bureau of Indian Affairs, 132 North Indian Avenue, Palm Springs, California. This sale will be conducted under regulations as amended and promulgated by the Secretary of the Interior, 25 CFR 189 (Act of March 3, 1909, 35 Stat. 731, 783; 25 U.S.C. 396) governing the leasing of Allotted lands and 25 CFR 186 (Act of May 11, 1938, 52 Stat. 347; 25 U.S.C. 396-af) governing the leasing of Tribal Land. Bids must be submitted separately for each tract, but no objection will be offered to award of more than one parcel to the same successful bidder, and inclusion of such contiguous tribal parcels in the same lease. No conditional or alternate bids will be considered or accepted.

Description of lands to be leased for oil and gas

T. 4 S., R. 5 E., S.B.M.

	No. Acres
Tribal Lands	
TRACT 1—S½ N½, Section 4	160
TRACT 2—N½ S½, Section 12	160
TRACT 3—S½; S½ NW¼; SW¼ NE¼, Section 14	440
TRACT 4—NW¼; W½ NE¼; SE¼ NE¼; N½ SW¼; SE¼ SW¼; SE¼, Section 22	560
TRACT 5—S½; NW¼; W½ NE¼, Section 24	560
TRACT 6—N½ N½, Section 26	160
Allotted Land	
TRACT 7—NE¼ NE¼, Section 22	40
TOTAL	2,080

The terms of the lease include the payment of a bonus as bid, a rental of $1.25 per acre per annum and a royalty of 12½% of the value or amount of all oil, gas, and/or natural gasoline, and/or all other hydrocarbon substances produced and saved from the land leased herein. The period of the lease is for 10 years from date of approval by the Commissioner of Indian Affairs and as much longer as the substances specified are produced in paying quantities. Leases will be sold for a bonus offer upon an acreage basis and no drilling proposition will be considered as a part of a bonus offer. The adequacy of bonus offers will be considered by the United States Geological Survey. Bids should be plainly marked on the outside of the envelope "Bid for oil and gas gas lease on Indian land." No bid received later than 10:00 A.M. on June 28, 1954 can be considered. Bids may be delivered in person or mailed to Palm Springs Sub-Agency, Sacramento Area Office, U. S. Bureau of Indians Affairs, P. O. Box 1229, Palm Springs, California. Bidders and interested parties may be present at the time bids are opened. Each bid must be accompanied by a certified check, cashier's check or postal money order payable to the order of THE TREASURER OF THE UNITED STATES for at least 20% of the bonus bid and of the first year's rental. Awards will be made to the highest acceptable bidder. In the event two or more bids are in the same amount and such bids are the high bids, the bidders submitting such bids may be required to draw lots to determine the successful bidder. The Commissioner of Indian Affairs, however, reserves the right to reject any or all bids. Deposits of unsuccessful bidders will be returned immediately after the bids are opened. All successful bidders will be required to obtain the signatures of the Indian lessors. Successful bidders must complete and return leases and all supporting papers within 20 days from date of award together with the balance of the bonus payment, full payment of the first year's rental, $5.00 lease fee and $1.00 for each set of forms and the cost of advertising. An additional period of time will be granted for good and sufficient reason upon request prior to expiration of the original 20-day period. The Area Director reserves the right, as a condition precedent to the granting of any extension for filing a completed lease, to require the deposit of any remaining sums due and owing on the lease including the 80 per cent of the bonus bid and the first year's rental. In additional to all other remedies provided by law, failure of the successful bidder to comply with the terms of the sale will render all deposits theretofore made by or due from him subject to forfeiture without further action on the part of this office. The right is reserved to reject any and all bids and to disapprove and reject prior to approval any leases made on an accepted bid; and should any bids be rejected or lease disapproved through no fault of the bidder, all deposits except the cost of advertising this lease sale shall be returned to the bidder. Lessees shall furnish with each lease, a bond with an acceptable company authorized to act as sole surety. Such bond shall be in amount as follows: For less than 80 acres, $1,000; for 80 acres and less than 120 acres, $1500; for 120 acres and not more than 160 acres, $2000; and for each additional 40 acres, or part thereof, above 160 acres, $500.: PROVIDED, That a lessee may file one bond in the sum of $15,000., covering all leases to which he is a party. The right is reserved at any time before or after approval of the lease to increase the amount of a bond above the sum named, in any case where the Secretary of the Interior deems it proper to do so. Lessees will be held responsible for complying with the requirements of the Federal Documentary Stamp Statutes. The parties to each lease shall agree to subscribe to and abide by any agreement for the cooperative or unit development of the field or area, affecting the leased lands, or any pool thereof, if and when collectively adopted by a majority operating interest therein and approved by the Secretary of the Interior, during the period of supervision. If the applicant for a lease is a corporation, it shall file with the lease evidence of authority of its officers to execute papers; and with its first application it shall also file a certified copy of its articles of incorporation, and, if foreign to the state in which the lands are located, evidence showing compliance with the corporation laws thereof. Further information regarding the leasing of these lands for oil and gas may be obtained from the District Agent, Palm Springs Sub-Agency, 132 North Indian Avenue (P. O. Box 1229), Palm Springs, California, at any time before the date of the opening of the bids. Leonard M. Hill, Area Director.

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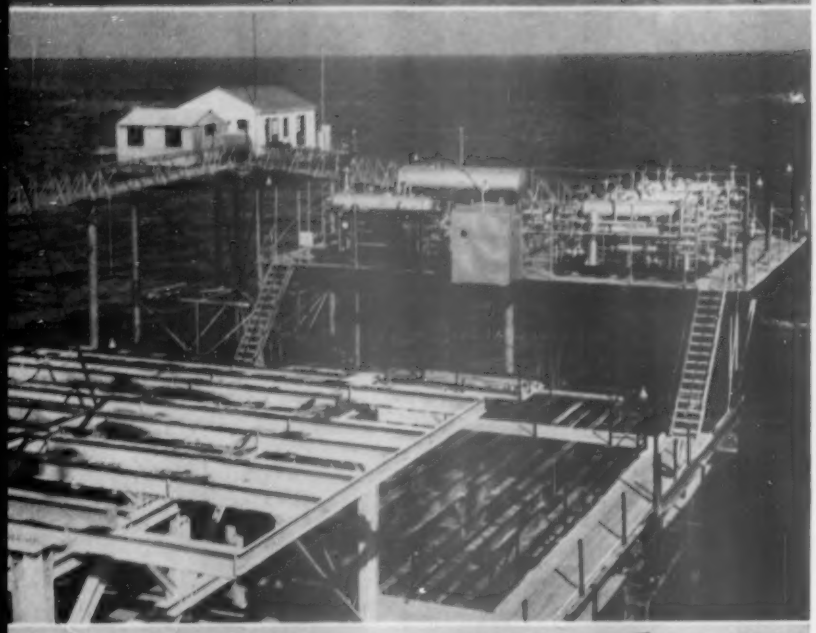

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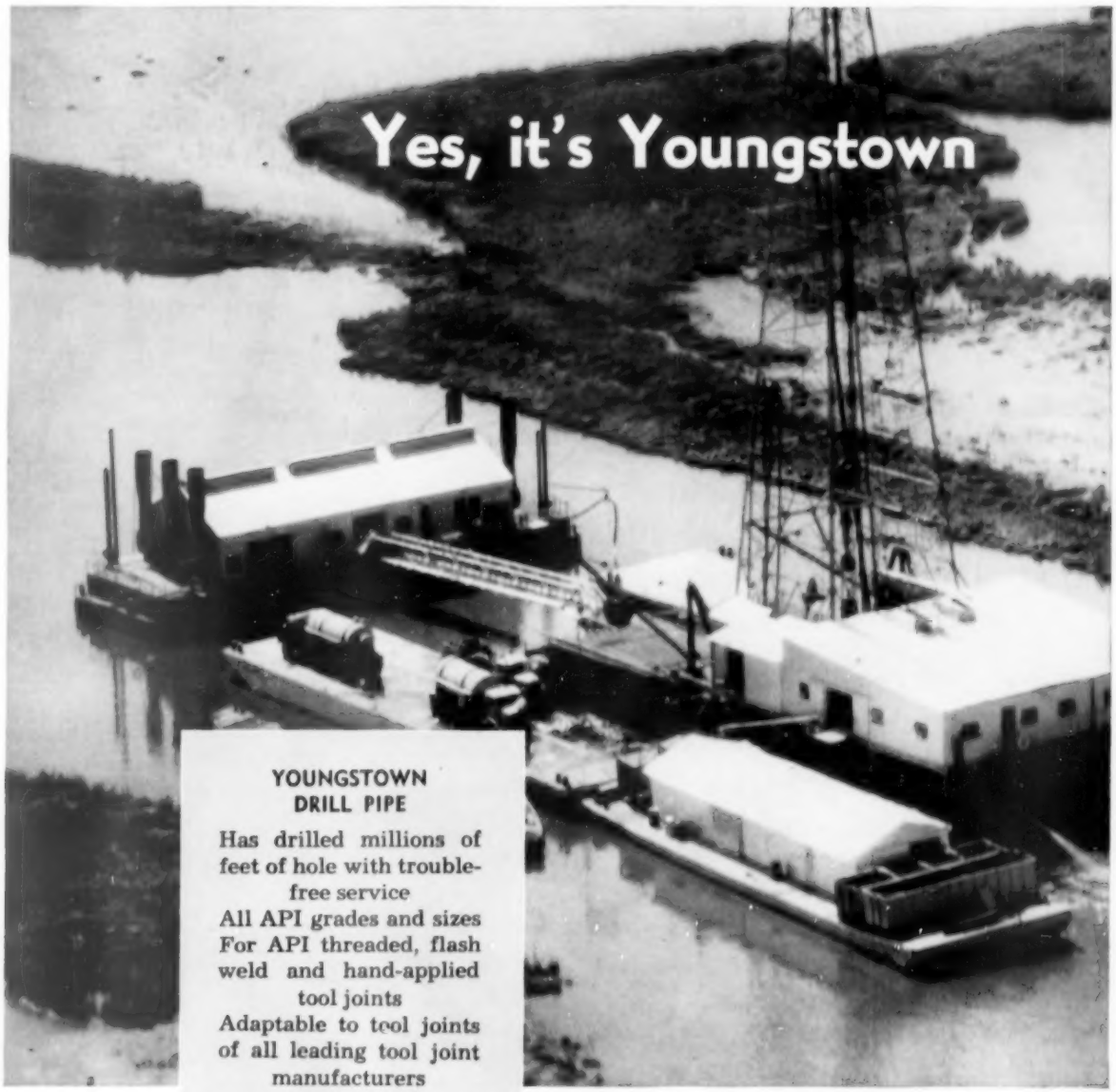

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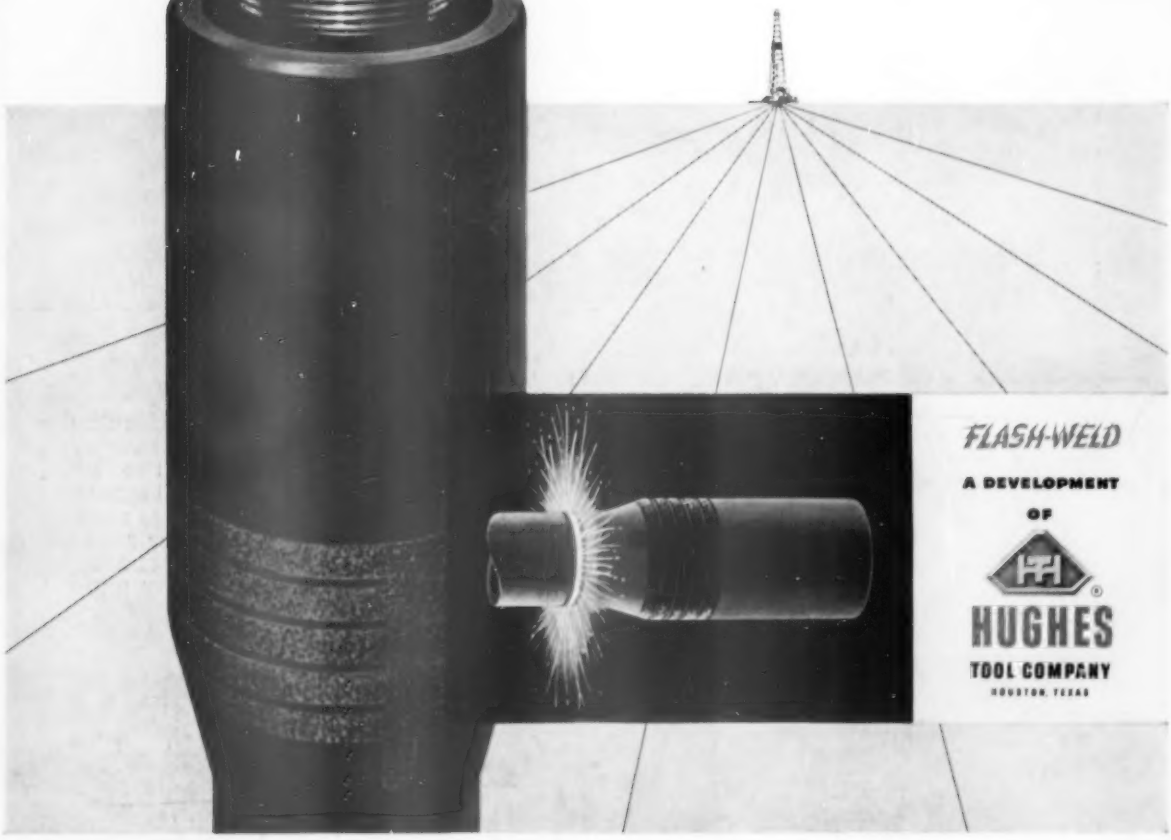

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